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HEALTH OF SCHOOL CHILDREN—II

Contributions from American Medical Journals: July, 1914, to July, 1915

Compiled by W. H. HECK
PROFESSOR OF EDUCATION, UNIVERSITY OF VIRGINIA

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HEALTH OF SCHOOL CHILDREN.[1]

CONTRIBUTIONS FROM AMERICAN MEDICAL JOURNALS, JULY, 1914, TO JULY, 1915.

A DEFINITE PLAN FOR A SYSTEM OF "HEALTH SUPERVISION" OF SCHOOL CHILDREN IN OHIO.

P. BRUCE BROCKWAY, M. D., *Chief of Medical Staff in Toledo Public Schools.*

(*Ohio State Medical Journal, September, 1914.*)

In the matter of standardization of health supervision (or medical inspection) of school children there should be a real basis of uniformity. This, it would seem, should be a card that will contain a record of data so complete and yet so simple that it can be used by the examining physician in the country school who is just beginning the work, as well as by the inspector of the larger city who has had an experience covering several years.

A uniform card used throughout the State of Ohio will permit the securing of statistics which is not possible under present conditions. In the accompanying form card there is given an idea that seems to answer the need and shows the facts in a way so simple that there can be but slight reason for a misunderstanding.

The cards, 4 by 6 inches, should be white for girls and yellow for the boys. This often cuts down by half the work of finding a certain card. The card gives ample room for the name and for about four addresses. This is very important and is based on the experience in Toledo, where a large percentage of the children frequently change their residence.

The line for "school attended" is ample and is necessary for the same reason, that is, to care for the floating child.

There is room for four examinations, two columns for each examination—the first column to contain the record of the inspector's finding and to be marked according to directions; the second column to show when correction of the defect had been made.

For example, if a defect of vision was found and the parents secured glasses and the nurse learned that the work had been done, she would simply write "glasses" or "gl." in the result column on

[1] See Bulletin, 1915, No. 4, for a similar publication covering the previous year.

the "vision" line and put her initials opposite "nurse." It might be well to use an "opt." or "oc." after the "gl.," which would show that they were secured from an optician or oculist.

On the age and grade line there can be secured a record by which one can judge the mentality of the child.

For example, if at the first examination she is 6 years old and in the first grade; at the second examination, 10 years old and in the third grade; at the third examination, 15 years old and in the fourth grade, such facts alone would warrant a question as to the mentality. Roman numerals should be used for grade and ordinary figures for age.

As to defects of seeing, if it is purely one of vision, a line can be drawn through the word "eye"; if it is a disease of the eye itself, cross out the word "vision." Same method should be used for hearing. This will make for greater definiteness.

On line 15 a similar method may be used, crossing out the word that is not appropriate.

The method of marking the various items on the card should be based upon the suggestions printed below, which should go out from the State health department to each active and every prospective examiner, who should use them as guides and adhere strictly to the rules. Following such a plan there will result a uniformity that will give great satisfaction.

The back of the card would be blank and could be used by the larger cities for the placing of any social service or other data that might be desired.

This card, together with a concise standardized notice form and exclusion blank, would meet the needs as regards school records.

It might be well to add a little pamphlet on the care of the teeth, to be given each child after examination.

Printed directions as to an efficient method for killing head lice and removing "nits" from the hair should be kept on hand and given out when needed.

Wooden tongue depressors (one for each child examined); a stethoscope, to be used without removal of the clothing for examining the heart and lungs; and an eye chart would be an ample equipment for a scheme of health supervision (or medical inspection) of school children.

The suggestions, which take up the spaces on the accompanying tentative card in numerical order, are as follows:

1. Each child should be examined upon entering school and again at the age period 7.9. This should be compulsory. Again at the age of 12 to 13, when there would remain an entire year to follow up the defects before pupils would leave elementary school.

Regarding the examination itself and as a basis for recording the findings, the following is offered:

2. Defect of vision—eyes. X. Denotes defective vision from disorders of refraction; give amount of defect in fractional form, based on Snellen chart. XX. Defective vision from muscular disorders (squint, nystagmus). XXX. Defective vision from disorders of lens, fundus, optic nerve (cataract, optic atrophy, etc.), or from past inflammation of media, etc. (corneal opacities, etc.).

If blind, due to any cause, make record and designate in which eye there is no vision, i. e., R. or L.

Use Trach. for trachoma; Conj. for conjunctivitis.

3. Defect of hearing—ears.

Forced whisper in quiet room at 20 feet might be used as a standard, deaf children hearing this only at 6 to 10 feet, but the routine use of a standard watch is better.

However, as a routine the closing of one ear with the finger and asking some common question in a whisper is sufficiently accurate to detect most of the instances of deafness. If external canal is plugged with wax—record same.

4. Defective nasal breathing. X. Adenoids as evidenced by mouth breathing or high palate. XX. Nasal obstruction without enlarged tonsils, including large turbinates.

5. Defective teeth.

If there are one or more carious teeth, a defect is to be recorded; that is, a single visible cavity of decay seen on cursory examination should receive dental attention. X. One or more carious teeth; indicate number. XX. Irregular teeth needing correction. XXX. Lacking but needing immediate dental care.

If teeth are filthy and uncared for, the record should be "dirt."

6. Hypertrophied tonsils.

Here there is difficulty in standardization, but the following is suggested as being practical: X. Tonsils just visible beyond the pillars of fauces. XX. Tonsils nearly approaching the midline. XXX. Any tonsil that needs enucleation for diseased condition, which would include all tonsils, however small, that are diseased or filled with purulent material.

7. Lymph nodes. X. Acute inflammatory enlargement.

Here the size is of small importance. It may be possible to give the cause, such as teeth, tonsils, pediculosis, etc.

XX. Chronic enlargement of double causation. It should be remembered that probably 90 per cent of children at school age have palpable cervical glands. It would therefore be useful to record here only those of such size as to be readily visible on extreme motion

of the head from side to side. The only value of following these up is the possibility of their being due to tuberculosis or Hodgkins disease, of which the definite signs may develop later.

XXX. Tubercular enlargements.

8. Defective chest.

Record should show data as to character of the condition; that is, whether flat, pigeon, or contracted, due to stooped shoulders, designated by the abbreviations fl., pig., or dep. Such defects should be considered in connection with—

9. Pulmonary disease. X would mean that a condition of an evident acute character existed, nontubercular; XX, a suspicion of there being present an early stage of tuberculosis; XXX would show a definite idea of tuberculosis being present, with such signs as elevated temperature, loss of weight, cough, etc.

10. Cardiac disease should be marked to show character of condition, whether functional (funct.) or organic (org.), and it should be desirable to have the record of a definite diagnosis of the character of the organic lesion.

11. Nervous disease should include epilepsy (epil.), chorea (chor.), and the various habit spasms (tic). A note should be sent to the parent for each finding under the heading of Defective chest, Pulmonary, Cardiac, or Nervous diseases, no matter how small the lesion appears.

12. Orthopedic defect should be marked to show anatomical location of defect. In this division should be included conditions due to infantile paralysis, ankylosed joints, and all conditions except where the spine is involved.

13. Defective spine. The record should show character of abnormality; Kyphosis (ky.), lordosis (lord.), scoliosis (scol.). The causative factor, as a defective school seat, might be designated under miscellaneous and connected by a line to "spine."

14. Skin disease. Name of lesion should be given in abbreviated form. Scabies (scab.), eczema (ecz.), impetigo (im.), ringworm (ring.), etc.

15. Personal hygiene. Here a distinction should be made between head and body—that is, to show whether pediculi are present or simply a lack of soap and water. The distinction should always be made between merely dirty and verminous child.

Personal hygiene (or body): X. Vermin present, as shown by marks. XX. Dirty clothing. XXX. Unwashed body.

Pediculosis (or head): Here great variation is found in the various reports as to standards adopted; classify thus: X. "Nits" few, found

only on careful search. XX. "Nits" found on casual examination. XXX. "Nits" found, live pediculi infesting the head—head sore, indicating gross neglect.

The matter of exclusion under this section must be determined by head conditions, history as to duration, and the home surroundings. For use at school, after one warning has been given, it is safe to saturate head with a mixture of crude oil and olive oil, which should be washed out in 6 or 12 hours, after which the hair should be combed out with strong vinegar.

16. Malnutrition. X, slight anæmia; XX, bad, as judged by apparent anæmia, underweight, underheight, and posture; XXX, extreme malnutrition, as evidenced by the profound anæmia, a marked discrepancy between height and weight when considered with age of child, and a posture that shows weakness and low vitality.

17. Mentality. Can be judged by the teacher's report, also by the age and grade progress and by the history as to the number of schools attended. However, the mental capacity is best classified according to the Binet-Simon system, and record can be made following such a physiological test.

Should a child test three years below physiological age or be three years or more back of normal grade, it is best to place him in a special class or school where the teaching may be properly adapted.

18. Infectious disease. Give abbreviated term to denote the diagnosis of any lesion.

19. Vaccination should be marked "yes" or "no" after inspection of the scar, but the statement of the pupils should be accepted when an examination is refused.

20. Miscellaneous gives space to record any data that are deemed necessary—goitre, for instance.

Physician making the examination should have initials placed in proper space. The nurse should initial when she treats a condition—pediculosis, for instance—or makes a call at home of pupil.

She should place an abbreviation in result column showing what family will do to correct the abnormality—M. D., physician; D. D. S., dentist; Spec., specialist for eye or throat; Disp., dispensary; Hosp., hospital. The reverse of card may be used to give any statement in full.

Each defect which is marked with XXX should be followed up or reexamined within the school year. At a subsequent examination it may be necessary to write in the name of some defect which was crossed out at former examination. Otherwise the card should fulfill all requirements for adaptability.

[Sample school card.]

Name.....

Address.....

Address.....

School.....

School.....

GIRL.

O=Exclusion.
X=Presence of defect.
XX=Notice to parent.
XXX=Immediate attention imperative.
Uncrossed, no findings.

Age ..... Grade	1	Result.	1	Result.	1	Result.	1	Result.
1. Date of physical examination								
2. Defect of vision—eye								
3. Defect of hearing—ear								
4. Defective nasal breathing								
5. Defective teeth								
6. Hypertrophied tonsils								
7. Lymph nodes								
8. Defective chest								
9. Pulmonary disease								
10. Cardiac disease								
11. Nervous disease								
12. Orthopedic defect								
13. Defective spine								
14. Skin disease								
15. Personal hygiene—pediculosis								
16. Malnutrition								
17. Mentality								
18. Infectious disease								
19. Vaccination								
20. Miscellaneous								

Physician..... Nurse.....

MEDICAL INSPECTION OF OPEN-AIR SCHOOLS.

JOHN AIKMAN, M. D., Open-Air School, Rochester, N. Y.

(*Journal of the American Medical Association, February 27, 1915.*)

The medical inspection of our school is not under the direction of the city school inspectors, but is provided by the Rochester Public Health Association, which maintains a general dispensary as well. In many ways this removal from the regular school system is an advantage. The child is really taken as a patient of the association and

all problems of physical welfare are settled by physicians from the staff. Thus it is possible to make complete physical examinations, while in the regular schools they are very limited, as the child must be examined dressed. The difficulty of having directions followed in regard to corrections of physical ailments, which presents such a problem in the regular schools, is here eliminated, as we have and exercise the right to exclude or dismiss any children not following out our instructions. Of course, such children are allowed to return to their former schools. Under these instructions would come removal of tonsils and adenoids, fitting of glasses, dental work, etc.

The routine now is as follows: All applications for admission are made at the association building and the examinations are made on a certain afternoon of each week by the medical director of the association. If the case is suitable, recommendations are made for filling the teeth, removal of tonsils and adenoids, treatment of skin conditions, and correction of anything that would prevent the child getting the most good out of the school.

At one time we simply made recommendations for these corrections and then admitted the children, but now we will not admit a case until all instructions have been carried out. This makes a reexamination necessary before the child can be put on the waiting list. Thus we are certain that the children are in good condition and we are saved the trouble of forcing the parents to care for these matters later.

After the first examination a visit is made at the home by the school nurse, who reports back on the home and financial conditions. If the parents are unable to take the child to a private physician for such care as is needed, the child is admitted as a patient of the association dispensary, where all examinations and operations may be secured. The nurse on this visit gives advice as to food, sleeping quarters, open windows, etc. She also fills out a report card on the home, and takes the history of the case as outlined.

Before we had a special nurse to visit these homes, the parents seemed to have an idea that the school would provide all the food required each day, and children were sent to school without breakfast, and some had no meal at night. As no school pretends to give a full diet, this made treatment in not a few cases very difficult. Such matters are now explained by the nurse.

If all directions have been carried out, the name is sent to the school and when a vacancy occurs the child is admitted.

The nurse gives the child a bath, takes a record of his weight, height, pulse, temperature, and chest expansion on the day of admission. These records, together with the report of the health association examinations and the nurse's report on the home and history, are before the physician when he makes his first examination at the

school. Then the child is given a fairly complete physical examination, which is recorded on the chart. A test for the percentage of hemoglobin is also made.

So we have for each child in the school:

1. Report of examination at time of application.
2. Report of home conditions.
3. History and physical condition.
4. Chart showing temperature, pulse, height, weight, chest expansion, and hemoglobin.

For keeping the four reports, both sides of two cards 7½ by 9¼ inches are utilized.

1. Across the top of the front of the physical examination card, with spaces for filling in, are the words: Name_____. Date of birth_____. Nationality_____. Address_____. Age_____. Sex_____. School_____. Grade_____. Date of admission_____. Sent by _____. Examined by Dr_____, at R. P. H. A_____, 19____. Date of discharge_____, 19____. Diagnosis_____. Principal_____. Examined by Dr_____.

The remainder of the card is divided into two columns, one headed "History" and the other "Physical examination." To guide the examiner, the history column contains the following outline: Family history—Father—Mother — Brothers — Sisters. Tuberculosis — Nervous diseases—Alcoholism—Home conditions—Sleeping rooms—Boarders. Previous history—Habits—Diet—Tea—Coffee—Alcohol—Sleep—Work—Bowels—Urination. Diseases of childhood—Venereal history. Previous diseases—Pneumonia—Pleurisy—Rheumatism—Tonsillitis—Tuberculosis. Injuries—Operations—Present History.

The physical examination column contains the following outline: General appearance—Nourishment — Deformities — Spinal curvatures — Skin — Mucous membranes—Color—Eyes—Ears—Nose—Throat—Tongue—Teeth. Heart—Apex beat—Dullness—Character of sounds—Regularity—Murmurs—Vessels—Pulse—Blood pressure. Chest and lungs—Inspection—Palpation—Percussion—Auscultation. Abdomen—Liver — Spleen — Extremities — Joints — Reflexes — Lymph nodes—Clinical data—Urine—Blood—Sputum, etc.

Beneath is printed: Diagnosis_____. Date_____, 19____. Examiner, Dr_____.

2. On the back of this card are columns for data under the following headings: Date; Time; Temp.; Pulse; Resp.; Weight, G., L.; Height; Chest, I., E.; Hem.; Remarks. There are 12 blank lines and at the bottom: Teeth: Condition_____. When cared for_____.

3. The front of the home-investigation report card contains the following outline to be filled in: No. _____. Name_____. Address_____. Sex_____. Age_____. Previous address_____. Nativity_____. In United States how long_____. City_____. Number in family_____. Boarders, male_____; female_____. Health of boarders_____. Father_____. Mother_____. Brothers_____. Sisters_____. Relatives _____. House_____. Number rooms_____. Number sleeping rooms _____. Occupies front_____; rear_____. Adjoining houses how near _____. Yard_____. Balcony_____. Size of child's room_____. Number windows_____; open_____; closed_____. Sleeps alone _____. Others in room_____. Sunlight_____; hours in room _____. Bathroom_____. Diet_____; milk_____; eggs_____.

Alcohol_____. Does child work_____? Average weekly income_____. Present income_____. Means of support_____. Insurance_____. Rent_____. Any business done on premises_____. Car fare_____. Towels_____. Amount paid for meals per day_____. Parents' attitude_____. Reported to_____. Reported from_____. Family physician_____.

4. The back of the card is ruled with 12 lines, one for each month, with columns headed as follows: Date (with five vertical subdivisions). Summary of visits: Sick, cooperative, primary, subsequent; Remarks; Days absent. At the bottom is a space for special notes.

After admission the children are given a bath once a week, and at that time records are taken of the temperature, pulse, weight, and chest expansion. These records are placed on a chart, where they may be read by all. This helps to keep the teachers familiar with the physical condition of the children. The hemoglobin is recorded twice a year.

Once a month every child in the school is seen by the physician. The patient is stripped to the waist and a general examination made. The physician has before him the record card, and can usually at a glance tell if anything unfavorable has happened since the last examination. If any loss of weight, increase in temperature, or other symptoms are recorded, a more careful examination is then made.

An office, with examining table, is provided for the physician, and the children can be examined rapidly, with two or three being prepared for examination all the time. In order to save time, it is better to examine boys on one day and girls on another.

On certain months special attention is given to the eyes, on another to the teeth or to spinal curvatures, and so on. We have called in specialists for consultation in selected groups of cases.

It is surprising how much can be learned in regard to a case in a very short space of time by this method.

All recommendations are noted on the chart and followed up the next month. The nurse makes notes of suggestions, and confers with the mothers if necessary. If we find that the child needs medical or surgical treatment, we have a record of the financial condition, and know whether or not the family has a private physician. If there is a family physician, we advise that the child be taken to his office, and furthermore, our suggestions are nearly always carried out. If the family is unable to secure such care, the nurse takes the child to the dispensary for treatment.

Unless the family physician advises against treatment, the corrections, as suggested, have to be made or the child is dismissed to return to the regular school. Great care is exercised that the rights of private physicians be respected.

We have carried out this program with a nurse visiting the school once a week, and with teachers assisting at examinations; but this

was unsatisfactory. Unless a physician can give several hours a week to the work, a school nurse is very necessary, if only on part time. At present we have a nurse but five forenoons a week for 60 children. The physician averages about three hours a week at the school.

We are of the opinion that a school nurse, even on part time, is one of the most valuable assets that an open-air school can have.

The duties of such a nurse are: (1) To visit the homes, reporting home conditions, history of the case, etc. To advise the family as to proper hygiene and care of the child. (2) To give the children weekly baths and to record weights, temperature, etc. (3) To assist the physician at all examinations and to file the records of the case. (4) To investigate cases of absence, because irregular attendance greatly interferes with good work at the school. (5) To supervise health matters at the school in the absence of the physician.

Further duties of the school physician are: (1) To inspect the building and schoolrooms frequently. (2) To offer suggestions as to exercises, clothing, open windows, food, rest, and in fact, anything in general hygiene that may be presented.

COUNTY HEALTH ORGANIZATION IN THE UNITED STATES.

LOUIS I. DUBLIN, PH. D., *Statistician, Metropolitan Life Insurance Co., New York.*

(Journal of the American Medical Association, November 14, 1914.)

We may conclude that full-time county health officers are an absolute necessity in most of our States; that very few such officers exist; that they are insufficiently paid; that responsibility to the centralized authority is lacking; and that county health work is only too often intimately connected with local politics. The present system of county health administration in the United States is inefficient and not conducive to the public welfare. The health officer of a large Western State aptly struck off the whole situation when he said: "The present system is not efficient and never can be."

What, then, is the solution to the problem presented by county health administration in the United States? It must be obvious that no system will be equally applicable to all the States. A plan that is practicable in New York may well prove ill-adapted because too expensive for a number of our Western or Southern States. Local conditions, both geographical and economic, will largely determine the details of organization. It is agreed, however, that certain fundamental considerations apply equally to all the States which have extensive rural populations, the local control of which is on the county plan. I propose to review briefly some of these requirements.

1. The county health organization of a State must be an integral part of the State health administration and be responsible to it. Public-health protection is primarily a State function. The county health officer and the county board, whenever there is one, should therefore hold themselves in readiness to enforce orders from the State department. They should, moreover, be subject to removal by the State department for cause. The State, on its part, however, must recognize this dependence of the local organization through State subsidies to help cover the necessary expenditures for county health work.

2. The county health officer must be a full-time official. He must be one whose sole interest is in the community to the exclusion of private interest, be it his own or that of private individuals or groups. We all know too well how often the part-time health officer who has a private practice to maintain must choose between the performance of public duty and the loss of his practice. This situation should not arise. He should never find it necessary to compete with those whom it is his duty to supervise.

3. The county health officer should be trained in the science of sanitation and public health. Most practicing physicians are not well enough equipped to administer a progressive health office. The protection of the public health as now conceived is a science, with its own data and formulas. The larger medical schools, such as those at Harvard and at the University of Michigan, for example, have organized special postgraduate courses leading to the degree of doctor in public health. It will be a great day in American public-health affairs when medical officers will as a class qualify by study in such postgraduate courses.

4. The tenure of office of the health officer should be coextensive with his efficient service. The successful health officer is made, not born. With a proper background of training, every year of added experience makes him a more useful servant of the State. The health officer should, therefore, be assured of a continuous tenure of office. He should in no way be a pawn in the political game. A period of six to eight years has been suggested as a sufficient term. Health officers who have made good should then be considered for reappointment, although the State may reserve the right to dismiss in shorter time those who are incompetent or neglectful of their duties.

In view of these requirements it should hardly be necessary to point out that county health officers must be reasonably compensated for their services. Surely, if full time is required, the compensation must be sufficient to attract and to keep good men in the service without inflicting hardships on them or their families. It is folly to set high standards and to make them impossible of attainment because of inadequate compensation or uncertainty of tenure. Salaries must

be adequate to attract able men and to maintain them in a state of comfort consistent with their important duties.

Permit me to point out more definitely the character of the return that awaits the States on their investment in full-time health officers. In spite of all our preconceived ideas as to the healthfulness of the country, the rural sections suffer severely from the ravages of tuberculosis. Such typically rural States as Kentucky and North Carolina (using these as examples) suffer a death-rate from tuberculosis higher than that for the registration States taken as a whole, and higher than for the registration cities. It would be the first duty of a full-time health officer to address himself to the tuberculosis problem of his rural communities.

The typhoid problem is equally urgent. In 1911 the death rate from this disease was 22.2 per 100,000 in the rural section, as against 18.6 in the cities of the registration States. These figures in themselves clearly indicate the many sanitary dangers incident to life in the country. Typhoid fever is always, to the health engineer, an unerring signal directing him toward polluted water supplies, infected food products, and unsupervised typhoid carriers. These are a constant menace to the entire State through their effect on milk and other food supplies. All of these sources of typhoid infection, including the disposal of dangerous waste products, lend themselves to the concerted efforts of modern sanitary science. Indeed, no disease has shown such a ready response to control as this preventable filth disease. The full-time health officer, supported enthusiastically by his community, would in the course of his first administration earn many times his cost in reducing sickness and death from this cause alone.

The full-time health officer would, of course, participate in other lines of health work. His influence would soon become evident in reduced rates of sickness and death from the other preventable diseases. In no one respect, however, would the services of the full-time officer be more constructive and remunerative to the community than his active participation in child hygiene. In the larger cities throughout the country this phase of health administration is now permanently established. In the country, on the other hand, this work has not received any serious attention. Children are not so well housed or so well fed in the country as in the city, and school buildings are so poorly constructed that the children are often exposed to conditions of weather and infection which bring about disease. It would be the function of the full-time county health officer to work in cooperation with the school authorities of his community and to see that each child in his jurisdiction is examined for physical defects at least twice a year. If there were no better excuse than the need

for some local authority to carry on intelligent and modern work in child hygiene, the States would be justified in appointing full-time county health officers for this purpose.

GENERAL DISINFECTANTS.[1]

(Journal of the American Medical Association, April 10, 1915.)

Everyone knows that sunlight and heat destroy all bacteria, but the limitations of these agents are not always appreciated. Direct bright sunlight shining immediately on bacteria destroys them rapidly, but when these are protected by even minute masses of dried organic matter they may escape destruction; therefore care should be exercised when sunlight is employed as a disinfectant to see that no small masses are present with bacteria in them.

Flat surfaces of wood and cloth may be disinfected readily by exposure to direct sunlight.

Heat of sufficient intensity destroys all organisms, but small masses of organic matter may protect bacteria to such an extent that even boiling for a short time will fail to destroy the organisms thus protected. Tetanus spores are not destroyed immediately in boiling water, even when they are not protected.

Few organisms, even spores, resist steam under pressure for more than a few minutes. Boiling water destroys nearly all organisms within half an hour. Even moderately hot water injures the bacillus of typhoid fever, and it is destroyed almost instantly in boiling water, provided that it is not protected at such times by masses of feces or other matter. Care should be exercised to see that such masses have been dissolved or disintegrated completely before the disinfection is begun, or, at any rate, before it is completed.

HALOGENS AND THEIR COMBINATIONS.

All of the halogens are actively disinfectant, but fluorin and bromin are too corrosive for general use. Chlorin is commonly used in the form of hypochlorites, which yield chlorin. Iodin is used in the form of a solution or tincture or in combination with an organic substance. Tincture of iodin is irritant, but is often applied locally for the disinfection of the skin. It is said that the skin should be thoroughly dried before the iodin is applied. Iodin is very commonly used to paint the skin at the site of a hypodermic injection or small incision.

While there is no question of the disinfectant action of iodin in vitro, there is a good deal of uncertainty concerning the degree of

[1] Title of series: "Practical Pharmacology."

its disinfectant activity after it comes in contact with the tissues with which it combines, for it then attacks bacteria less energetically.

Iodin is also destructive to larger parasites which infest the skin.

Among the combinations of iodin with organic substances are iodoform, iodothymol, or thymol iodid, which has been mentioned.

Iodoform is not actively disinfectant, but when applied to moist wounds it decomposes slowly with the liberation of active iodin, partly free and partly in unknown combinations. It is sometimes absorbed from open wounds, probably in the form of one of these unknown compounds, and gives rise to characteristic symptoms of poisoning. The first symptoms consist in disturbances of the central nervous system; these are followed only after several days by excitement, restlessness, anesthesia, and sometimes by unconsciousness. Stimulation may alternate with depression or there may be pure narcosis.

These symptoms do not occur unless iodoform is used over large surfaces or for a considerable period of time. It is not necessary to discuss the actions of iodoform after internal administration, because there is no occasion to administer it internally.

Iodoform is applied in the form of an emulsion or as a dusting powder, especially in the surgical treatment of tuberculosis. It may be used as a suppository for the relief of painful hemorrhoids.

Chlorid of lime, so called, which is a mixture containing hypochlorites mainly, which readily yield free chlorin, is one of the most commonly used of household disinfectants and bleaching agents. It is corrosive, attacking metals and destroying fabrics.

Chlorin is available in the form of other hypochlorites, which may be decomposed to yield free chlorin.

FORMALDEHYDE.

Formic aldehyde, or formaldehyde, is a very active antiseptic, but its germicidal powers vary widely with the organism and the conditions under which it is employed. It has been found that tubercle bacilli require 45 minutes for their destruction in a 5 per cent solution; with a higher temperature the solution is more active. The gaseous formaldehyde is not to be depended on as a germicide when the temperature is lower than 16 C. (60.8 F.)

Tightly closed rooms may be disinfected by wetting sheets with 150 cubic centimeters (5 fluid ounces) of the official formaldehyde solution for each thousand cubic feet of space, and allowing this to evaporate. The room is kept closed for 24 hours. The formaldehyde may be sprayed through a keyhole into the closed room, but this is inconvenient. Candles are now sold for fumigating rooms with formaldehyde, this being the most convenient method available.

Rooms may be fumigated in the way indicated, but clothing and other fabrics must be hung up so that the gas will come in contact with every portion. The room should be heated if the fumigation is carried out in winter, and the atmosphere should be kept moist by the evaporation of water. The gas does not injure fabrics.

Formaldehyde has a wide field of usefulness as a disinfectant, and the solution may be used for fabrics which may be wet by it without injury. The irritant vapor of formaldehyde persists in the atmosphere of a room for some time after the doors and windows are opened; this disadvantage may be overcome in part by spraying a little ammonia into the atmosphere or, more conveniently, by exposing it freely on plates.

Among the cheaper disinfectants used in cesspools, drains, and other large spaces are copperas, or ferrous sulphate; sulphur, as brimstone or roll sulphur, which is burned in an iron pot or other suitable container; and lime, which is used either as milk of lime to dissolve organic matter and destroy the bacteria, or as a whitewash for application to flat surfaces.

Halsey states that sulphurous acid affords the only practical means of destroying the mosquito that carries the infection of yellow fever, and that it is commonly used in living rooms. Burning sulphur is converted into the dioxid, and this into sulphurous acid when it comes in contact with moisture.

Copperas is an excellent deodorant for urinals, a handful of the crystals being thrown into the urinal and allowed to dissolve slowly. The fumes of burning sulphur, or sulphur dioxid, are extremely irritating and poisonous, and they corrode metals and fabrics; hence disinfection by this means is limited to large rooms and spaces where the corrosive action will not cause damage.

Polished metal fixtures and many other articles and substances may be protected against sulphurous acid and other corrosive fumes by coating them with paraffin.

The paraffin is melted and while quite hot it is applied with an ordinary paint brush. It solidifies instantly, forming a thin coating which may be removed later without difficulty.

Potassium permanganate in solution decomposes all organic matter with which it is brought in contact; it is useful as a deodorant, but not especially as a disinfectant, since it does not attack bacteria more readily than other organic matter. The solution stains the hands and is disagreeable to use.

Mercuric chlorid is one of the most powerful disinfectants which we possess, but its action is greatly interfered with by organic matter. It attacks metals, and hence it can not be used for the sterilization of surgical instruments. It may be used for sterilizing the water which has been used to bathe a patient suffering from an infectious disease,

and to sterilize the urine, or even the feces, provided these are nearly liquid and small masses are disintegrated, but it is not so useful for the latter purpose as a strong mixture of lime and water. A solution containing 1 part of mercuric chlorid to 10,000 parts of water is rapidly fatal to many spores and all nonspore forms of bacteria. The intensity of the action is, of course, increased with higher temperatures.

The extraordinary toxicity of mercuric chlorid is one of the greatest disadvantages in its use.

HYDROGEN PEROXID.

The official solution of hydrogen dioxid has been freely used and widely abused as a germicide and disinfectant. In the presence of pus or other organic matter it is decomposed with brisk evolution of oxygen. This effervescence is of advantage in its use as a detergent, either in connection with open wounds or ulcers, exposed mucous surfaces, or as a wash for the mouth and teeth. It is obviously unsuited for injection into sinuses or subcutaneously, as the gas resulting from its decomposition tends to destroy tissues and spread infection. Hydrogen peroxid applied to bleeding wounds acts as a styptic by coagulating albumin, and has come to be a popular household remedy.

Many of the widely advertised antiseptics are wholly useless as disinfectants, and no one should depend on the directions which accompany these for preventing the spread of contagious diseases. The so-called chlorids, such as Platt's, may have some value as deodorants, but they can not be used for disinfecting rooms and fabrics.

The difficulty of destroying microorganisms in the body tissues is shown by the results obtained by Bechhold and Ehrlich in their experiments with a large number of agents, including numerous halogen combinations with benzine derivatives. Some of these compounds were extraordinarily active against certain organisms in the test tube, but they were uniformly ineffective in much greater concentration when used in the body. The fact can not be reiterated too emphatically that test-tube demonstrations of disinfectants and antiseptics, however brilliant, afford no index of therapeutic value when the agents are used internally against infection in man.

VOLATILE OILS.

Spices and related aromatic substances have been used as preservatives from time immemorial, but it is only recently that any experiments have been made to determine the relative antiseptic and disinfectant activity of essential oils and their constituents.

Martindale found that a few of the essential oils compare well with thymol and other phenols in antiseptic activity, though most of them are much weaker.

Oil of turpentine has had an especial vogue as an antiseptic in surgery, but most of the volatile oils have come to occupy a subordinate place among the disinfectants and antiseptics, except for a few special indications, such as that of sandalwood oil in gonorrhea.

BORIC ACID AND BORAX.

Boric acid is weakly antiseptic, but hardly at all destructive to the more common bacteria, though it destroys certain molds readily, and it is especially useful for the destruction of Oidium albicans, the parasite which produces the condition known as thrush.

It is soothing when applied to inflamed mucous membranes in the form of solution or dusting powder, but the continued use of even small amounts internally gives rise to gastrointestinal irritation.

Daily doses of as much as 1 gm. (15 grains) increase the combustion of fats and interfere with their utilization as food, and loss of body weight has been observed after the use of boric acid for a few days.

Borax, or sodium borate, is even less actively antiseptic than boric acid; hence such large amounts are required when it is used as a food preservative that they are almost certain to cause some disturbance if taken continuously in the more commonly used foods, such as milk and butter, especially when the elimination—slow at all times—is interfered with as in nephritis, leading to accumulation of the poison in the body.

Even moderate amounts may induce nephritis, thus setting up a vicious circle of slow elimination and increasing nephritis. Very large doses (such, however, as would not be taken in the form of food preservative) cause gastroenteritis, disturbances of vision, fatty degeneration of various organs, and collapse.

Borax interferes with the coagulation of casein, thereby retarding its digestion; hence its use as a preservative of milk is to be especially condemned.

It is sometimes urged in favor of the use of borax as a food preservative that fish and other perishable foods decompose more readily without its use and give rise to ptomaine poisoning. This, though undesirable, does not justify the use of a substance which is certain to cause injury at times. The only proper way to guard against ptomaine poisoning is to avoid the use of spoiled food.

Boric acid is commonly used in from 2 to 4 per cent solutions for washing the bladder in cystitis, as a wash in conjunctivitis and in catarrhal conditions of other mucous membranes. It was formerly

used freely for washing the rectum and other organs, and large amounts were frequently left in the organ to act as an antiseptic; but severe and even fatal poisoning has resulted from this practice in a number of cases. Boric acid is frequently used in combination with starch, talcum, or other diluent as a dusting powder on inflamed surfaces.

Solution of borax is used as a mild antiseptic and astringent eyewash, and as a gargle and mouth wash. It may be prescribed somewhat as follows as an eyewash:

		gm.	or cc.	
℞	Sodii boratis	0	5	=gr. viii.
	Aquæ camphoræ	10	0	=f℥ iss.
	Aquæ q. s. ad	30	0	=f℥ i.

M.

A stronger solution may be used as a gargle or as a wash in pruritis, in which case a small amount of glycerin may be added.

Boric acid has been used internally in cystitis, but with the introduction of better urinary antiseptics, such as hexamethylenamin, its use in that way has been discontinued. There are no clear indications for the internal administration of either boric acid or borax.

PREVENTION OF SCHOOLROOM DISEASE AND DUST.

C. WARD CRAMPTON, M. D., New York.

(*Medical Record, N. Y., August 22, 1914.*)

The annual recurrence of measles, diphtheria, scarlet fever, common colds, influenza, and the like among school children causes an annual loss of uncountable days of absence. The financial and educational losses can be estimated only. It probably exceeds the cost of over 40,000,000 school days per annum.

The method of prevention of these diseases has in the past mainly developed along the lines of exclusion of those suffering from contagious disease, members of the family, and suspects who have been brought into contact with sufferers. While this is partially effective and there have been developed excellent methods for the regulation of exclusion, the general problem will not be solved without reference to the two most important factors in the transmission of diseases, which are (1) an effort to prevent the dissemination of infectious material by coughing and sneezing, (2) the prevention of school dust.

Prevention of coughing and sneezing.—It is agreed that measles, diphtheria, scarlet fever, influenza, and common colds are mainly transmitted by the expulsion of infectious material from the mouth and nose in coughing, sneezing, and talking. At present our school authorities have not arrived at the point of excluding every child from the classroom who has his first cough or sneeze, and it is at

present doubtful if such procedure would be warranted. The problem may be attacked very definitely by an effort on the part of the teacher to control coughing and sneezing in so far as it lies within her power.

A form circular was issued to the New York public school teachers, reading as follows:

1. Scarlet fever, measles, diphtheria, influenza, and common colds are often spread by coughing and sneezing. This occurs frequently before the child appears to be ill.

2. When a child coughs or sneezes he is apt to expel into the air visible droplets or an invisible spray containing bacteria and other germs which cause the diseases above mentioned.

3. Children should be instructed as follows: (*a*) Each child should be urged to provide himself with a clean handkerchief. It should be carried conveniently, so that it will be available for immediate use. (*b*) Children should be instructed, when coughing or sneezing, to guard the mouth and nose with a handkerchief, so that none of the infectious material will be cast upon his associates or distributed throughout the room. The impulse to sneeze is often so sudden that this can not be done. The child should therefore get into the habit when he coughs or sneezes of turning the head away from his neighbors and should guard the mouth and nose with the hand, but every effort should be made to make proper use of the handkerchief.

The most recent medical investigations have demonstrated beyond doubt that the diseases mentioned above are transmitted by coughing and sneezing and that these precautions against infection will do much to eliminate them.

It is impossible to tell exactly how much good this has done. Without implying a definite causal relation, it is interesting to note that the number of cases of scarlet fever reported from January 1 to June 14, 1913, is 2,724 less than the average of the preceding two years. The number of cases of measles for a similar period is less by 2,367.

Dust prevention.—The definite causal relation of dust and disease has recently been disclosed in an endeavor to place before the medical and lay public the rôle of droplet infection.

Most classrooms have wooden floors, which are (supposed to be) swept every day, and are scrubbed from two to ten times a year. The floor may be perfectly clean at the beginning of the school session, and yet upon the entrance of the first pupil it becomes dusty. Moreover, every movement of the child about the room during its physical-training exercises and marching causes the dust to rise in miniature geysers from the cracks which have not been reached by the broom of the janitor.

Immediately after the physical training exercises the air of the room is thoroughly saturated with dust which is breathed by the children and can be seen upon the handkerchiefs from blowing the nose shortly after the close of the exercise.

* * * * * * *

Five years ago the use of floor dressing was common. In many schools it has been discontinued because the careless use of large quantities, allowing a little oil to remain on the floor, soiled the dresses of the teachers and made the floors slippery. In addition it was claimed that the oil-impregnated floors increased the fire hazard.

The opinion of the bureau of fire prevention of the New York fire department is to the effect that any oil dressing may be used on the floors if the flash point is not more than 150° F. Accordingly, this was taken into consideration and a dressing of a flash point of 300° F. was selected. In addition the experimenter used an applicator in the form of a small reservoir with a felt mop inserted at the bottom for the purpose of evenly distributing the material. The results in so far as teachers, janitors, and principals were concerned were highly favorable. The results from the bacteriological standpoint are shown in the following summary of the bacteriological report from Wallace A. Manheimer;

No. 1. After the oil had been on the floor for 58 consecutive days without renewal, the following tests were made; these tests (made to determine the efficiency of floor oil in preventing the raising of dust before and after conducting physical drills, both in rooms that had been and in others that had not been treated with floor oil) showed--

(*a*) That there was less dust in the treated than in the untreated rooms, even before the floors were disturbed, though the differences were not marked.

(*b*) That the oil was efficient in causing more than 80 per cent of the dust to adhere to the surface of the floor disturbed by physical exercises.

2. Similar tests made before and after the rooms had been swept indicated an efficiency of over 85 per cent. Thus the oil is valuable in protecting not only the health of teachers and students, but also that of workmen employed to clean the rooms.

3. Tests made on experimental boards (artificial floors) under controlled conditions verified the above conclusions and indicated an even higher percentage of efficiency—91 to 100 per cent.

COUGHS.[1]

(Journal of the American Medical Association, Jan. 16, 1915.)

Before discussing the infections of grip and whooping cough it may not be out of place to refer to the varying kinds of cough. The trained nurse at the school, if not the teacher, should be able to note and describe the character of a child's cough to the medical inspector. Only by careful observation can the early stages of whooping cough be suspected and discovered.

Coughing is an expiratory effort caused reflexly by some irritation. The muscles of the lower part of the chest are most engaged in the act of coughing; hence in severe, prolonged, or frequent coughing muscle tire occurs in the lower part of the chest, both anteriorly and poste-

[1] Title of series: "Prevention is Greater than Cure."

riorly. The abdominal muscles all take part in this expiratory effort, and the erector spinæ muscles, the serratus, and the quadratus lumborum are all utilized in a strong expiratory cough. These muscle contractions compress in all directions the lower part of the chest, and the air in the bronchial tubes is forced upward, and, if there is no obstruction, is expelled through the glottis. If there is obstruction, or even partial obstruction, the upper portion of the lungs, especially the apices, become dilated and temporarily, or in severe cases permanently, emphysematous.

Cough can be caused by irritation of any of the mucous membranes of the air tract, by irritations of the pharynx, by reflex irritation of the vomiting center, and by any irritation that can reach, through the pneumogastric nerve, the center in the medulla. From any of these reflex causes efferent impulses are transmitted, and the result is a cough. Irritation in the nose and ear may cause cough.

Pain and muscle tire from prolonged coughing, besides occurring in the lower part of the chest, occur in the sides, low down, perhaps in the region of the diaphragm, and also in the back, even down in the lumbar region. These strong contractions of the abdominal muscles during coughing also aid in temporarily diminishing the capacity of the thorax by pushing upward the abdominal organs. At the same time there is a considerable force exerted downward, which may tend to cause uterine displacements, hemorrhoids, and even involuntary urination.

Before this forcible expiration or cough there is generally a deep, quick inspiration; then the glottis is partially closed and the air is propelled upward forcibly, causing friction, which tends to expel anything on the walls of the mucous membrane of the bronchial tubes and trachea. Even in simple bronchitis, if there is much coughing, there will be found increased resonance in the apices of the lungs, as there is probably always a temporary emphysema.

Nasal irritations may produce cough as frequently as they cause asthma. Irritations of the nasopharynx and pharynx proper frequently cause coughing, which is very likely to be accompanied by retching and even vomiting. An elongated uvula may tickle the epiglottis and cause spasmodic quick expiratory coughing. This cause, however, is rare, compared with the frequency of cough caused by an enlarged lingual tonsil, whether the tonsil is hypertrophied, contains dilated blood vessels, or is inflamed. Any disturbance of this gland or lymphoid tissue may cause a tickling in this region sufficient to produce a very irritating and disturbing dry cough, which comes on sometimes in paroxysms, until a certain amount of mucus is literally scraped off. The very intensity of the cough so irritates the part, like scratching a spot on the skin that itches, as to stop the

tickling sensation for a time. Irritations of the larynx almost always cause cough. Hence no examination of a patient who coughs is complete without a throat and larynx observation.

The dry bark of spasmodic croup is very characteristic. The noise is low-pitched and is a bark. If it is husky, there is mucus or membrane present.

The cough of bronchitis can be of all descriptions; it may be dry, may be nonproductive, and may be moist and productive. Pain in such cough (the same is true of grip) is referred under the sternum and is due largely to the vibrations of the air causing pain to the inflamed mucous membrane of the trachea and perhaps larger bronchi.

The cough of pneumonia is at first somewhat painful, and the pain is referred to the side, near the nipple. This cough may be at first dry, but is soon productive and generally should be encouraged.

The cough of pleurisy is nonproductive and undesired, and is never loud. It causes pain referred to the side, and is repressed by the patient. There is nothing to expectorate, and it should be discouraged and stopped.

The cough in the first stage of tuberculosis is often dry and catchy; it is a hack. There is no great intensity to this cough, and no necessity for it, and it should be discouraged. As soon as there is much local bronchial catarrh, the cough should, as it is then productive, not be discouraged, except at meals, and in the presence of others; that is, such patients should be taught when to cough.

The cough of asthma is a wheezing affair and accompanied by all sorts of rattlings; the same type occurs in a stuffy asthmatic bronchitis. This cough is generally not harsh.

The coughs of different individuals vary. Some always cough with great intensity and others easily and lightly. Older persons seem to raise mucus and pus from the bronchial tubes with difficulty. It takes a great many coughs to raise the sputum for expectoration. Young children generally cough easily, but generally swallow their sputum. Very weak patients will hardly expectorate at all. In such cases the foot of the bed may be raised at night; also when they cough, while in bed, they should turn over on the side or stomach in order to raise the sputum, or they should lean over, in order to have gravity aid as much as possible the expulsion of the mucus, etc. The cough of pertussis occurs in showers or paroxysms, and at the height of the disease the glottis closes during inspiration and the air is sucked in through a more or less narrow slit, giving the characteristic "whoop."

Persons coughing very hard, as typically in whooping cough, but also in emphysema and in the severe bronchitis of strong, sturdy men, will cause a great deal of cardiac disturbance by retarding the flow

in the large vessels of the thorax, thus increasing the work of the heart, especially of the right side. Such coughing can force backward the blood in the large veins, thus congesting all the organs, notably the eyes, face, and head. and whooping cough can cause a cerebral hemorrhage into the eyes. These patients may not infrequently have nosebleed, and even vomit blood.

COUGHS.

ROBERT MORTIMER JONES, M. D., New York.

(Journal of Ophthalmology, Otology, and Laryngology, July, 1914.)

Every practitioner of medicine is called upon at one time or another to prescribe for coughs, and at the present time, when there seems to be a prevalence of acute rhinitis, pharyngitis, and laryngitis, it may be of interest to consider briefly the coughs which do not yield to the ordinary remedies.

We have so many remedies in our materia medica, the provings of which have been so clearly defined and the administration of which has achieved such brilliant results, that it is disappointing to fail to cure a persistent cough after the most careful study of the totality of the symptoms.

The coughs in these cases frequently prove to be of reflex origin, and the removal of the cause of the condition often effects speedy cure.

Elongation of the uvula is a very common cause of a reflex cough, the tip of the uvula just touching the base of the tongue or the margin of the epiglottis, causing a hacking cough, most disagreeable to the patient, and not amenable to medical treatment.

Hypertrophy of the lingual tonsil frequently causes paroxysmal attacks of coughing, aggravated by use of the voice, accompanied by a prickling sensation and the feeling of a foreign body. On examination the mass of lymphoid tissue may be found so large as to push the epiglottis backward.

An area of ulceration in the glosso-epiglottic fold may cause a persistent cough, which will cease after one or two applications of some astringent.

Acute inflammation in the larynx, with cough but with no perceptible lesion, not yielding to medical treatment, will sometimes be entirely cured by the application of some astringent in the pyriform sinus, acting in the way of a counterirritant.

Varicose conditions of the vessels of the pharynx and larynx cause cough and a constant desire to clear the throat of what seems to the patient a foreign body. Rupture of one or more of these vessels gives rise to hemorrhage, which is frequently attributed to other causes.

Hyperemia of the mucous membrane of the larynx and trachea is often noted in these cases of persistent cough, particularly of the trachea, in which cases soothing applications of oil by means of the nebulizer will give relief where remedies fail to do so.

Elongation of the faucial tonsils is frequently the cause of a reflex cough; the faucial tonsils are not necessarily markedly hypertrophied, but may be elongated to such an extent as to be in contact with the base of the tongue, sometimes pushing the tongue over somewhat to the side.

Deformities in the nose, spurs or ridges on the nasal septum, forming a point of contact with one or other of the turbinates, are causes of reflex coughs. This is especially marked in cases of enlargement or malposition of the middle turbinate, where pressure is caused at the point of contact. In some instances the examining surgeon produces paroxysms of coughing by passing a probe or applicator over a ridge or spur of the nasal septum. These cases are cured by correction of the deformities and destruction of the contact point.

A very common cause of reflex cough is pressure from impacted cerumen in the external auditory canal, the patient not being conscious of loss or diminution of hearing, but complaining only of the hacking cough. I have treated a great many cases where the washing out of the mass of cerumen was immediately followed by cessation of the cough.

RECURRENT BRONCHITIS IN CHILDREN.

CHARLES GILMORE KERLEY, M. D., New York.

(*Pediatrics, April, 1915.*)

By recurrent bronchitis we are to be understood as including those cases of illness in which there are attacks of bronchitis with severe cough, often with bronchial spasm. A small proportion of the cases suffer from true asthma. Fever, while sometimes present, is not necessarily a part of the disorder. The child is brought with the story that there are frequent colds and cough and bronchitis. The bronchitis is usually of an asthmatic type; that one attack is barely recovered from before another supervenes, sufficient in many cases to entail chronic invalidism, preventing or seriously interfering with attendance at school. The repeated illnesses entail a housing and loss of appetite, which in the process of time may result in defective growth and development. Usually, but not invariably, the child is free from trouble during the summer, but with the advent of autumn the so-called colds begin. These cases are to be differentiated from the usual infectious colds, bronchitis, and influenza by the fact that in these disorders there is fever, prostration, and loss of appetite. Of course, there may be at times an associated infection, but in the vast majority of the attacks in a given case such symptoms are not present.

As time passed and as a great many cases of this type were encountered, it was impressed upon me that there must be some common ground, some similar constitutional state, that rendered these children subject to the attacks, that rendered them unable to stand the usual exposure which failed to affect other children. Through comparison of the cases and investigation of the family histories, it appeared to me that I could set apart these children, that they could be grouped in a class having several features in common. It was found that a considerable portion of the patients had been difficult feeders in infancy, that bottle feeding had been unusually troublesome.

It was also found that not a few were subject to, or had, bad eczema. It was found that recurrent vomiting and so-called bilious attacks were not uncommon, and that many of the patients were the offspring of those who had suffered from disorders of metabolism, such as gout, rheumatism, periodic headache, so-called bilious attacks, and chronic eczema.

They were very apt to have a habitually coated tongue and rarely possessed a vigorous appetite. There are here no constant gastro-enteric symptoms. There are here no constant urinary changes. By observation and acquaintance with the peculiarities of a great many cases, it was demonstrated that these children bore cow's milk fat badly. In not a few cases it was given in but small amounts or did not agree. It was also found that these children bore sugar badly, attacks being precipitated by free indulgences. The influence of butter fat and sugar was also shown by the gratifying relief of the patient when these substances were largely removed from the diet. There appeared to be a faulty oxidation; the child showed but a limited capacity for the oxidation of these high carbon foods; their complete conversion into energy, CO_2, and metabolic water was not possible, intermediary, at present; indeterminate toxic products were the outcome, which become manifest in different ways, and one of these ways appeared to be a lessening of resistance or of an establishment of an unusual irritability upon the respiratory tract.

These cases are similar to other periodic illnesses, such as recurrent vomiting, recurrent periodic fever with acetonuria, and recurrent eczema, in that the attacks are more apt to occur during the colder months, when the elimination by the skin is less active and when muscular exertion is more in abeyance.

Among 141 cases of recurrent vomiting 41 per cent suffered from recurrent colds.

The so-called catching of cold because of cold and inclement weather is much less a factor in these than has been supposed, because when

the patients are fed and managed right the weather has but little influence—just about as much as it has in a periodic fever, with acetonuria. Again, not a few of these cases will have periodic colds during the summer.

In short, we have demonstrated clinically that these cases of recurrent coughs with bronchitis, usually with spasm, are the result of a systemic intoxication, due to the use of certain food substances which the organism is incapable of properly accommodating. As an associated factor defective skin elimination and absence of adequate muscle exercise are contributory causes.

I have had to treat a great many of these cases during the past few years, and while I have met with flat failures, in the vast majority of cases (probably 95 per cent) the results have been most gratifying.

Management.—Believing that our trouble basically is largely a matter of food intoxication of a definite type, the source of the intoxication is removed. The average child after the sixth year receives two or three times as much energy food as he requires.

Milk and sugar are not indispensable for any child after the fifteenth month. I have brought up several children without cow's milk, and they differ in no way in their development from other children.

Cane sugar was not cultivated until 300 years ago, and as late as the sixteenth century it was used largely as a condiment, as honey is used at the present time. Countless millions existed and lived their span of life without it. Now we require 40 pounds a year per capita. It requires no great strain upon the imagination to believe that the introduction of so large an amount of a highly energized food in excess of demands might produce ailments of a very definite character.

The recurrent bronchitic patients are cut off from sugar largely—entirely, if the case promises to be difficult. Cow's milk is omitted entirely if the case is obstinate, but skimmed milk is allowed. Time and again I have seen children from 3 to 6 years of age gain from 3 to 6 pounds after removing sugar from the diet and giving milk skimmed or none at all. An apparent handicap was removed, and they would take more of other food and assimilate it. The carbohydrates and fats found in vegetables, cereals, breadstuffs, and meats supply all the heat and energy required.

Clothing.—I usually advise that medium-weight underclothing or linen mesh be used. The child is given a warm bath at bedtime, followed by a vigorous rubbing and sometimes massage.

Inasmuch as the so-called lithæmic type is the individual most frequently affected, I give such children interval treatment with bicarbonate of soda alone or with the salicylate of soda.

Bowel function.—If habitual constipation is present, a free daily evacuation of the bowels is insured by suitable treatment.

PROPHYLAXIS OF DIPHTHERIA IN SCHOOLS.[1]

(Journal of the American Medical Association, February 20, 1915.)

When it is reported to a school board and to a board of health that a school child is sick with diphtheria, it should first be remembered that with every discovered case probably one other missed case occurs. Of course the sick child is isolated. The other children of this family should have cultures taken from their throats to determine whether or not the Klebs-Loeffler bacillus is present; but, without waiting for the results of this investigation, each should receive an immunizing dose of 1,000 units of diphtheria antitoxin, unless their history shows that they are asthmatics or sufferers from hay fever. As it takes from 24 to 48 hours for the Schick test to develop, it seems unwise, in the case of children who have been in close contact with the infected patient, to postpone the administration of the antitoxin until a Schick test shows whether or not they are already protected.

These children should, of course, all be forbidden to attend school, and should be isolated as far as possible from other children. If the infected child comes from a tenement house where there are many children, the other children in this tenement should also be excluded from school until it is shown that their throats contain no Klebs-Loeffler bacilli.

If several cases of diphtheria occur one after the other or more or less rapidly in a schoolroom or in different parts of a school, all of the children who are closely associated, either at their desks or in classes or as chums, should have their throats tested to ascertain who are the bacillus carriers. Instruction should be carefully given to the parents of the children who are well, but have been positively exposed to diphtheria, to prevent their playing with unexposed children, thus possibly spreading the disease, before it is ascertained that they are free from diphtheria bacilli.

General disinfection, by fumigation, of a schoolroom which has contained several diphtheria cases is considered by most advanced sanitary experts as unnecessary and of little value. If swabs from the throat of all the children in this room are taken and the room then closed for 24 hours and thoroughly sprayed and washed with germicidal solutions, the other children who do not belong to the infected families may return to the schoolroom as soon as the board of health has determined which throats carry the diphtheria bacilli. It does not seem scientifically wise or economically sensible to close a schoolroom or a school building for an indefinite period when the foregoing measures will be effective in stamping out the disease.

A child whose throat and nose are found to be free from the Klebs-Loeffler bacillus may immediately return to school, provided he is not allowed to come in contact again with a new case of diphtheria.

[1] Title of series: Prevention is Greater than Cure.

A child whose throat does contain the diphtheria bacilli, though he is not ill, should be isolated and treated with antitoxin if he has been recently exposed, or with the method suggested above for treatment carriers, if he has apparently not been recently exposed. Under any circumstances such a child should not be allowed in school.

The throats of the teachers and instructers in the schools in which diphtheria has occurred should also be tested. Other members of the family in which there is a patient with diphtheria should be examined, and if they are found free from the bacilli and do not come in contact with the patient, they can with propriety live at home and attend to their regular occupation. This is on the supposition that the infected patient is properly quarantined (which means the kind of quarantine advised by the board of health), is attended by a physician, and is cared for by a nurse, or by one person who remains isolated with the patient, at least as far as close contact with others is concerned. There is no reason why the nurse should not change her clothing and go out for fresh air daily. She should not go into stores or ride in cars where she might give the disease to others, as she is likely to carry the germ in her own throat, though being herself immune.

It should be again urged that a throat with spots or membrane should be considered as likely to be diphtheritic until a culture has proved it not to be. Such a patient should be isolated in the best room available, looking toward the possibility of the disease being diphtheria and a nurse being required. Other children of the family must be excluded from contact with this patient. If the case is clinically one of follicular tonsillitis, the physician may wait for a positive test before giving antitoxin. If, however, the case is clinically diphtheria, antitoxin should be given without a report being waited for, provided there is nothing in the history of the patient to show that there will be any hypersusceptibility to horse serum. If the disease is diphtheria, and the patient is in a tenement, where it is impossible to carry out isolation, he should be removed to a contagious-disease hospital, if the city has one. Whether it is follicular tonsillitis or other streptococcic infection, or diphtheria proper, gargles and local cleanliness of the throat should be immediately inaugurated, and when this is properly carried out the danger of infection of others is reduced to a minimum.

TRANSMISSION OF MEASLES.

(Editorial in New York Medical Journal, March 6, 1915.)

The discontinuance of fumigation after contagious diseases by the New York board of health, as a measure in keeping with the most modern advances on the subject, helps to recall to mind that there has

been a radical change in the ideas on the mode of transmission of the contagious diseases. This is particularly the case with measles. This disease was always considered air-borne, and it was believed that contact was not necessary. As early as 1852, Myre showed that this disease was transmitted through the agency of the nasal and the buccal secretions. This has lately received corroboration by Anderson and Goldberger, of the hygienic laboratory. The infection is a droplet infection from these secretions and is confined to the immediate vicinity of the patient—within the droplet radius. But fomites—clothing, linens, and other material from the patient—may carry the contagion.

The air-borne character of the contagion has led many of the children's hospitals on the Continent to discontinue separate isolation rooms for these patients, and to treat them in the open ward, surrounded, perhaps, with a wire screen, as a reminder to the nurse of the character of the disease and the necessity for care in handling. This method has resulted in a large saving of expense and annoyance. Except for the carrying of the contagion of measles on fomites, there are no carriers of measles in the same sense as there are carriers of diphtheria, typhoid fever, cholera, etc.

The virus of measles is contained in the blood at least 24 hours before the eruption, but begins to fade about 24 hours thereafter. During this period monkeys have been successfully inoculated. The contagious stage of measles is the preeruptive or catarrhal stage. It is during this period that the disease is transmitted, and the diagnosis must be made, and proper isolation is necessary to prevent spread. Children who are known to have been exposed to infection need not necessarily be excluded from school if they are examined daily for the presence of catarrhal symptoms. The absence of such symptoms would mean the absence of the agencies for the transmission of the disease.

The branlike, fine, desquamating epithelium in measles has always been considered the principal means of transmitting the disease, and the quarantine was never raised until the total disappearance of the flakes. This has not been borne out by experiment, and the theory is now discarded. In two or three weeks, and after the disinfection of clothing and the like, the quarantine can be raised without fumigation and without fear.

The danger of measles is not discounted by this new procedure. When improperly cared for, and in the presence of complications, measles is one of the most serious diseases, although the laity holds it very lightly. Among many savage tribes measles alone, even without complications, has a very high death rate. In them the disease has been known to wipe out whole communities and to rival the mortality from plague during the Middle Ages.

MANNER OF SPREAD AND PREVENTION OF CONTACT IN SCARLET FEVER.

EDWIN H. PLACE, M. D., Boston City Hospital.

(*American Journal of Public Health, September, 1914.*)

The evidence as to the manner of spread has never been more clear or the views more reasonable. One must consider, first, point of exit of virus from body; second, the viability of the virus outside the body; third, the manner of transfer of virus; and, fourth, the portal of entry, including invasive power and virulence of the virus and the resistance of the patient.

Evidence as to the point of egress of the virus has come largely from a study of return cases following discharge from isolation, particularly from hospitals. Previous views have held to the contagiousness of the epithelium. The evidence was largely the supposed coincidence of the periods of desquamation and contagiousness. This conclusion seems to have come from the well-recognized experience that cases developing scarlet fever in contact with other children usually did not transmit the disease if isolated at once, while when desquamating cases had associated with others contagion often occurred. This, however, entirely overlooked the important difference of degree and duration of contact in the two conditions. Besides, many experiences have shown that cases, although desquamating, have not transmitted the disease.

Hospital experience, especially, shows that the disease is not spread particularly by air currents, although the powdery desquamation must be easily disseminated. On the other hand, contagion clearly lingers where there remain unhealed areas of the body surface, whether cutaneous or mucous. Lesions of the nose and nasal mucous membranes have been most frequently a source of contagion, probably because the discharges from this region are so readily spread about. Aural discharges, discharges from paronychias, abscesses, abrasions, sinuses, etc., are less frequently a source of danger and seem to vary according to the facility with which the discharge may be transmitted freely—e. g., a sinus covered by a surgical dressing and properly handled in changing, so that no discharge may get about, seems to be safe to others. I do not believe that all cases having lesions of this group are a source of danger, but it is impossible at present to distinguish certainly the dangerous and the nondangerous ones.

Evidence is lacking as to the infectiousness of the excreta.

Viability of the virus outside the body is extremely difficult to determine and our evidence is based on clinical experience with human beings. Where scientific control can not be secured, how unreliable such evidence is likely to be is well instanced in the earlier

history of yellow fever and malaria. In general we have some reason to believe that, under good conditions of light and air and drying, the virus rapidly dies, perhaps in hours or days. It is probable that under suitable conditions of gross contamination and exclusion of light, heat, and fresh air, infectious material may remain viable and virulent for days or weeks. Whether the virus may remain viable and virulent for many months, as often believed, may be doubted, but proof either way is slight.

Manner of transfer of virus is clearly by transmission of infectious matter from one person to another, an intermediate host not being required. This transfer may be effected either by direct contact between the case or carrier and the victim or by indirect contact through infected objects, particularly dishes, drinking glasses, handkerchiefs, towels, pencils, candy, chewing gum, etc. Direct contact is the more important and the more frequent cause of transfer. The disease may also be transmitted by food supplies, as milk, a form of indirect contact. Under occasional conditions it may be transmitted by droplets thrown out in coughing or sneezing or spitting. This is not an important manner of spread epidemiologically, as the disease is not attended by coughing and sneezing usually, as are measles and whooping cough. Flies may spread the disease, but they also do not play a large rôle in the prevalence, as the curve of incidence does not correspond at all with the prevalence of this insect. The disease is not spread by air except as given above.

The portal of entry is not known, but suspicions point to the mucous membranes of the throat and nose; possible, but not probably, to the gastroenteric tract and lungs. The uninjured skin is a practically impervious barrier to infection. It is probable that a normal and intact mucous membrane is likewise a fair barrier to infection, but slight lesions and trauma are so common and moisture and warmth are so favorable to infection that no great dependence can be placed on this protection. Wounds, burns, and punctures of the skin probably allow entrance of infection, as frequently shown by the disease following these conditions in nurses, doctors, etc., but this can not be proved, as the ordinary channel can not be excluded.

The invasive power of the virus and the resistance of the individual are unknown. Immunity, as we use the term, includes all these factors. It seems certain that early infancy, as well as adult life, is more immune than childhood. Part of this apparent immunity is probably due to modes of life which do not bring infection frequently or intimately to the individual. This is shown by the higher adult incidence in milk-borne epidemics. Nurses at the south department contract scarlet fever in less than 3 per cent. The medical students contract the disease in a small fraction of a per cent. The incidence among children is given at from 25 per cent to 50 per cent or more.

The medical students give a history of having had the disease, chiefly in childhood, in about 20 per cent. I believe that a large majority of people, probably 75 per cent, escape the disease. The low incidence among nurses suggests that immunity has come with adult life, but it must be acknowledged that suitable technique may prevent infection in many nurses who are not immune.

PREVENTION OF CONTACT.

First, through restrictions of all cases or carriers of the disease, and, second, restrictions of healthy people who may have been in contact, in a disease spreading as slowly as scarlet fever, prevention of contact should be of great value in control, but proof is, however, not very conclusive that this has been so. Failure must be laid to (1) insufficiently early isolation; (2) imperfect isolation through faulty methods or methods imperfectly carried out; (3) too short isolation; and (4) missed cases. This method is our most promising one at this time, and it should be more efficiently applied. The net must have no hole, the chain no weak link to make it a success.

Restriction of well persons is being given up. On a large scale it passed with a better knowledge of yellow fever and a greater certainty of the efficiency of vaccination in smallpox. It probably will never return, except under very unusual conditions. In scarlet fever restriction of well adults should be limited to those who handle food supplies, as milk, and who come from houses where the disease is present and likely to contaminate them. Adults, especially males, so rarely develop the disease in families where children are ill that shutting them off from their labors, as carpentry and all outdoor work, not especially offering contact with food or children, is unnecessary. This is, however, frequently practiced in small communities in Massachusetts.

Children who have been exposed, or where exposure may continue, should be restricted as far as possible from intimate contact with other children and should be kept out of school until danger of developing the disease is passed.

Closure of schools because of the disease developing therein is of little value, because it is not closed sufficiently long for the carrier or missed case to become harmless, and because contact at home or in the neighborhood is likely to introduce the disease again through mild or missed cases. Besides, experience shows that by repeated careful inspections by experts and exclusion of the suspects and new cases as they arise the disease may be speedily eliminated from the school.

Prevention of spread may be aided by proper education, without restrictions of the activity of persons. Education of people, through social service and other ways, to avoid the spread of nose and throat

secretions, by care with towels and handkerchiefs, by precautions as to eating, sleeping, playing together of children, would do much to prevent the transmission of the disease.

Communities may well obtain better results than the present if the known methods of control are applied more completely and intelligently.

ANTITYPHOID VACCINATION.

From discussion by MAJ. E. R. WHITMORE, United States Army.

(*Bulletin of the Johns Hopkins Hospital, March, 1915.*)

Maj. Whitmore described the vaccine used by the United States Army and the technique employed in its preparation. The vaccine is derived from a single strain of low virulence obtained from a patient at Netley, England, in 1900.

In discussing the length of time that the vaccine retains its immunizing qualities, Maj. Whitmore spoke of the results obtained by Leishman, who sent a supply of vaccine to India which was not kept in a refrigerator. It was tested after six months and found to be still good. The United States Army, however, insists upon a time limit of four months.

The administration calls for subcutaneous injection, which is followed by a local and sometimes by a general reaction. Russell kept a record of over 130,000 injections, and found that in over 96 per cent the general reaction was mild or absent.

Vaccine treatment was inaugurated in the Army in 1909, and in 1911 vaccination was made compulsory for all persons mobilized in the camp in Texas. There were 13,000 men in camp for a period of four months, with only two deaths from typhoid, a decided contrast to conditions in the camp of 11,000 men in Jacksonville during the Spanish-American War, where, with similar surroundings, there were 2,693 certain or probable cases of typhoid, with 214 deaths from the disease. There have been no cases of typhoid in an Army camp since 1911. In September, 1911, vaccination was made compulsory for all persons under 45 years of age. During the past year there were six cases of typhoid in the whole Army, two in unvaccinated men and four in vaccinated men. Of these latter, three had received one dose and one had received a second dose of the vaccine just before entering the hospital. It is evident, therefore, that all four patients had been infected before receiving the vaccine.

The duration of the immunity seems to be uncertain. In some patients agglutination disappeared from the blood within two years. In the Army the dosage for a second administration of the vaccine is the same as that given the first time.

In regard to the question of the negative phase—as to whether vaccination increases susceptibility for a time—statistics compiled by various observers fail to show any proof in favor of this theory, especially when the present mode of vaccination is employed.

With regard to the contention that tuberculosis is caused by the vaccine, statistics show that tuberculosis is actually decreasing in the Army and also in the Navy, where vaccination is also compulsory.

Vaccination for typhoid is, of course, now quite common, but one is not ready yet to advise it for the general community. To persons, however, who intend to move into a locality where typhoid fever is prevalent and to travelers, who can not be sure what they are eating or drinking, this prophylactic measure would seem to be a wise precaution.

INFANTILE PARALYSIS.[1]

SIMON FLEXNER, M. D., Rockefeller Institute, New York.

(*American Journal of Diseases of Children, May, 1915.*)

I.

The two problems of uppermost interest in respect to epidemic poliomyelitis are: First, the mode of infection; and, second, the nature of the specific microorganism causing the disease. I propose to deal briefly with these two aspects of the subject.

Two views are entertained regarding the mode of infection. According to one, the infectious agent of the disease is communicated by personal contact; according to the other, it is conveyed by the stable fly. The differences involved in these two conceptions are fundamental, and hence the practices looking toward prevention of the malady based on them must be wholly different if they are to achieve the result desired. For that reason it is imperative that the validity of the two doctrines be carefully scrutinized and appraised.

Let us examine first the evidence available bearing on the insect conveyance of the disease. This notion was suggested, in the first place, by the seasonal prevalence of epidemic poliomyelitis, which is predominantly a disease of midsummer and early autumn. However, it is not, strictly speaking, thus narrowly limited in incidence, since cases occur in the spring and even in the winter months, although they are few in number.

In the second place, the notion is supported by the rural character of some epidemics as well as by the relatively wide distances which separate many of the cases. In these instances, however, the peculiarities are of degree rather than kind. Epidemics of poliomyelitis

[1] Title of article: The Mode of Infection and Etiology of Epidemic Poliomyelitis.

prevail also in towns and cities, and cases may be closely associated, as well as widely separated.

The notion of insect carriage received for a time the support of experimental evidence, without which it would have remained merely a suggestive possibility, and the wide currency which this notion has obtained among the laity depends wholly on an imperfect experimental foundation which has now been largely disproved.

At the congress of hygiene and demography held in Washington in 1912, Dr. M. J. Rosenau, of the Harvard Medical School, announced, as will be recalled, that he had succeeded in communicating experimental poliomyelitis to several monkeys by permitting stable flies to feed first on monkeys inoculated intracerebrally with the poliomyelitis virus and then on normal monkeys. Although the studies which he reported were then incomplete and he made his announcement in a judiciously tentative fashion, he expressed the opinion that the flies might carry the infective agent, and also that in conveying it from one human being to another an intervening period of time was necessary, during which the virus underwent some change of development within the insect host. This announcement was followed very quickly by a confirmatory one emanating from Anderson and Frost, of the United States Public Health Laboratory in Washington.

No satisfactory explanation of the successful experiments performed by Rosenau and by Anderson and Frost has thus far been offered, since in no other instance have confirmatory results been obtained. The great importance of the subject led immediately to a repetition of the experiments in several laboratories in this country and in certain laboratories abroad, without yielding a single instance of positive infection. Moreover, Anderson and Frost themselves a little later announced that they had failed subsequently to repeat their earlier experiments.

Without pursuing this topic further, we may now turn our attention to the other conception, namely, that infection in poliomyelitis is conveyed through personal contact. In considering that view of the mode of infection it is necessary at the outset to have an understanding of the clinical types of poliomyelitis. So far as the affection was conceived of as a frankly paralytic disease in all instances it was impossible to trace the connection of cases one with another, but once it was determined—as was done by Wickman—that epidemic poliomyelitis assumes nonparalytic and ambulant forms, the subject of the mode of infection was opened up to restudy and to a wholly new interpretation.

The proof of the existence of abortive and ambulant forms of poliomyelitis is not clinical merely, but depends also on laboratory findings. The several laboratory findings may be stated briefly to be,

the following: The detection of changes in the cerebrospinal fluid, the demonstration of neutralizing immunity principles in the blood, and the determination of the presence of the virus of poliomyelitis on the upper respiratory mucous membrane. The changes in the cerebrospinal fluid consist of increased cellular content and the presence of globulin; the two conditions may coexist. The new cells are chiefly lymphocytes. The neutralizing properties of the blood depend on the appearance in the serum of immunity principles absent from the normal blood, which correspond to similar immunity principles arising after a frank attack of paralytic poliomyelitis. The virus of the disease has been detected on the nasal and pharyngeal mucous membranes in such quantity and quality as to make possible the communication of poliomyelitis to monkeys. The unmistakable demonstration, both by clinical observation and laboratory tests, of the existence of abortive and ambulant cases of epidemic poliomyelitis—many of which may and do escape detection—indicates how wide, indiscriminate, and unsuspected the distribution of the virus by personal contact may readily become.

But the facts now in hand carry us beyond the distributing power exercised by the frank and abortive ambulant cases, since it can now be affirmed that epidemic poliomyelitis is one of the diseases in which both healthy and chronic carriers of the microbic agent of infection arise. The few healthy carriers thus far detected consist of persons who have been in very close and intimate contact with persons acutely ill with poliomyelitis; for example, the parents of a paralyzed child. The few instances of chronic carriers now known consist of persons who have recovered from an acute attack, but in whom at the expiration of several months the virus has been detected, by animal inoculation, on the upper respiratory mucous membrane. The two classes last mentioned of potential carriers of the infectious agent add materially to the possibility of wide dissemination of the virus.

It is very important, now that the existence of healthy and chronic carriers of the infectious agent of epidemic poliomyelitis is established, that there should not arise undue concern regarding the dangers of conveying the disease, while the fact should be taken into account in devising measures for the prevention of the conveyance. Possessing, as we do at present, only the imperfect means of animal inoculation for detecting the virus of poliomyelitis, still it appears that the healthy and chronic carriers are not more numerous in this disease than in many other infections of more common occurrence.

Given, therefore, the possibility of the distribution of the virus being effected by, first, the frankly ill; second, the slightly ill; third, healthy; and fourth, chronic carriers, the striking discrepancy noted between the prevalence of cases in small, sparsely populated rural

communities and the more thickly populated towns and cities at once disappears.

To sum up the aspect of the subject concerning the mode of infection, we may now state emphatically that the indications are all in favor of personal communication of the virus. Hence the measures which we seek to put into effect against the introduction and spread of epidemic poliomyelitis should now be based on the conception of the personal factor as paramount, and not on the notion of insect carriage.

II.

I turn now to the question of the nature of the virus or microorganism causing epidemic poliomelitis. You will recall that the virus is filterable—that is, it passes through the pores of earthenware filters which exclude under similar conditions the ordinary bacteria. We are now acquainted with a score or so of diseases in man and animals definitely proved or believed to be caused by parasites belonging to this filterable class. It is self-evident that these parasites are very minute; and because of their minuteness it has until recently been doubted whether they had actually been viewed under the microscope.

About two years ago Dr. Noguchi and I announced that cultures of a very minute organism had been obtained which might be regarded as the possible microbic agent of epidemic poliomyelitis. The cultures were derived from the central nervous organs of human beings and monkeys who had poliomyelitis. As evidence of the nature of the cultures, it could then be stated that experimental poliomyelitis had been produced in monkeys by inoculation of the cultures. We have recently confirmed this result in an interesting manner. The culture employed for inoculation had been isolated about 18 months before and had gone through a number of generations in artificial mediums. It was cultivated finally in a mixture of ascitic fluid and broth, and the fluid carrying large numbers of the microorganisms—which are of extremely minute size—was infected, in some cases intraspinally, in others intraperitoneally into rhesus monkeys. The injection produced no immediate effect; indeed, a single injection caused no effect whatever. But when the intraperitoneal and intraspinal injections were repeated three or four times, the animals developed paralysis, and the paralyzed animals showed the peculiar histologic changes of the central nervous system indicative of poliomyelitis. In other words, these experiments showed that a culture of the microorganism mentioned, long removed from the nervous tissues, is capable of causing infection of monkeys, and that by this means the symptoms and lesions of epidemic poliomyelitis are produced.

The fact that several inoculations of the culture were required to cause infection agrees with observations previously made by Lewis and myself, that when a subminimal dose of the usual virus of poliomyelitis is injected into monkeys, no effect is produced; but when the subminimal injections are repeated, paralysis may suddenly supervene. The two sets of observations are, therefore, in accord.

SUMMARY.

These data have led me to believe, first, that the microbic agent of epidemic poliomyelitis is present in the nasal and buccal secretions and is carried by persons, not insects, and communicated by them in such manner as to gain access to the upper respiratory mucous membranes of other persons, among whom a portion, being susceptible to the injurious action of the virus, acquire the infection and develop the disease.

The clinical variety or form of the disease which they develop may be the frankly paralytic, or the abortive and ambulatory, in which no severe symptoms whatever appear. But however the persons may be affected, they become potential agents of dissemination of the virus of poliomyelitis, as do a number of healthy persons who have been in intimate contact with those who are ill, and another group of persons who have recovered from an acute attack of poliomyelitis. These several classes of infected or contaminated persons constitute the active means through which the virus is spread and to the control of which sanitary measures designed to prevent epidemics must be directed.

Finally, the virus or microbic agent of epidemic poliomyelitis appears now to have been cultivated and to consist of minute globular bodies, capable of being distinctly viewed under the high powers of the microscope.

PELLAGRA IN CHILDREN.

GASTON J. GREIL, M. D., St. Margaret's Hospital, Montgomery, Ala.

(*Southern Medical Journal, January, 1915.*)

The cases here reported are from my dispensaries in West End and in North Montgomery, the factory districts, and include only the children who were brought to these dispensaries for treatment. In obtaining the history a card furnished by the Thompson-McFadden Pellagra Commission was followed in order to obtain a better idea of the living condition of the several patients. In all I have had under observation 32 children, but report only 6 as typical of whole.

Upon careful inquiry and from a map of the city I find that pellagra is not confined to any specific district, but can be found in all sections, principally in those not having sanitary connections. In all the cases reported to me or that have come under my observation the artesian water from the city was used. In none of them were there sanitary connections, the ordinary backhouse or common privy being the only available place, and that not being more than 25 to 50 feet from the house, except in one case, where they had a homemade sanitation.

The cases in West End were scattered, three to six blocks intervening. Those in North Montgomery were closer, a number of cases developing on the same street (Factory Row). These cases were somewhat milder, the children presenting a much better appearance.

Etiology.—Age and sex seem to have no bearing on the disease. My cases all range from 2 to 12 years and about equal as to sex. Almost every form of insects and parasites has been tried as being the cause or carrier, but no conviction has resulted. Most of the attacks occur in the spring, early summer, or autumn. It is usually found in insanitary surroundings.

Symptomatology.—The cases I have seen present very well-marked gastrointestinal symptoms and symmetrical skin lesions, either of which may appear first; some are presented to the clinic as iliocolitis cases and some purely on account of the skin lesions and because there are several other cases in the neighborhood or because some other member of the family has the disease. In most cases seen by me there is a mild or severe stomatitis. I have seen no cases with constipation.

Prognosis.—I believe that the disease in children is a low grade of infection and that with proper hygienic surroundings and with proper diet they will all recover. Almost all the cases I have under observation have their first attack and have improved very rapidly; those suffering from second or third attacks have improved, but more slowly; of the 32 cases, all have markedly improved.

Treatment.—Hygienic, the liberal use of water, better nourishment, and drugs, the drug used being Fowler solution in gradually increasing doses or the Fowler solution in combination with potassium iodide. After the disappearance of the symptoms a tonic of iron and arsenic was used. In almost all the cases hookworm ova were present; these were, of course, treated.

In conclusion I wish to say that these cases have been under observation for only about three months; the treatment will be continued and a further report will be made next year.

THE THOMPSON-McFADDEN PELLAGRA COMMISSION.

J. F. SILER, M. D., United States Army; P. E. GARRISON, M. D., United States Navy; W. J. MACNEAL, M. D., New York.

(*Journal of the American Medical Association, September 26, 1914.*)

The chief conclusions from the first year's work were as follows:

1. The supposition that the ingestion of good or spoiled maize is the essential cause of pellagra is not supported by our study.

2. Pellagra is in all probability a specific infectious disease communicable from person to person by means at present unknown.

3. We have discovered no evidence incriminating flies of the genus Simulium in the causation of pellagra, except their universal distribution throughout the area studied. If it is distributed by a blood-sucking insect, *Stomoxys calcitrans* would appear to be the most probable carrier.

4. We are inclined to regard intimate association in the household and the contamination of food with the excretions of pellagrins as possible modes of distribution of the disease.

5. No specific cause of pellagra has been recognized.

The chief conclusions from the second year's work are as follows:

1. The large active foci of pellagra in Spartanburg County were found in and near the large centers of population, and particularly in the cotton-mill villages.

2. Children under the age of 2, adolescents for about five years following puberty, and adult males in the active period of life were least frequently affected by pellagra. On the other hand, women from 20 to 44 years of age, old persons of both sexes, and children from 2 to 10 years of age were most frequently affected.

3. No definite connection between occupation and the occurrence of pellagra has been found, although the high pellagra morbidity in the women and children points to the home as the place in which the disease is usually contracted.

4. In the group of incident cases most thoroughly studied evidence of close association with a preexisting case was disclosed in more than 80 per cent.

5. A house-to-house canvass of the homes of over 5,000 people living in six endemic foci of pellagra failed to disclose any definite relation of the disease to any element of the dietary.

6. In these six villages new cases of pellagra originated almost exclusively in a house in which a preexisting pellagrin was living, or next door to such a house, suggesting that the disease has spread from old cases as centers.

7. So far as we have observed, pellagra has spread most rapidly in districts where insanitary methods of sewage disposal have been in use.

8. Additional evidence has been obtained to support the conclusion that flies of the genus Simulium have nothing to do with pellagra.

9. Animal inoculations and the experimental study of intestinal bacteria have not yielded conclusive results.

10. The studies of the blood have shown a lymphocytosis in most cases, but have not disclosed any constant abnormality characteristic of pellagra.

11. There is no evidence of inheritance of pellagra.

12. The immediate results of hygienic and dietetic treatment in adults have been good, but after returning to former conditions of environment most of the cases have recurred. In children prognosis is very much more favorable.

TRACHOMA.

JOHN RUHRAH, M. D., College of Physicians and Surgeons, Baltimore.

(*Progressive Medicine, March, 1915.*)

Among the diseases that formerly attracted very little attention, and which have caused very widespread suffering in the United States, is trachoma. I have noted previously the work being done by the United States Public Health Service in determining the severity and prevalence of trachoma in various parts of the United States. Several additional surveys have been published, including the one of the mountain sections of Virginia and West Virginia by Clark, of the mountain section of North Carolina and South Carolina by Foster, and one of the mountain sections of eastern Tennessee and northern Georgia by Bailey.

In North Carolina the disease exists only in isolated localities, there being three different foci in different parts of the State. The origin of the disease is not at all clear, and it is evident that it has existed for a long while. * * * In Virginia and West Virginia, particularly in the former, the disease is very prevalent, and is present in a sufficient degree to make it one of the serious problems of public health. The counties of the eastern edge of West Virginia are apparently free from it, but this is probably due to the fact that there is very little communication with other parts of the State because of the existence of no direct routes of communication. There have been no systematic efforts made to control the spread of the disease, and people with trachoma are allowed to go about freely from place to place.

The disease is one of the causes of a considerable amount of damage to vision, and as many as 5.95 per cent of treated cases suffer with marked disturbance to sight. This leads to increasing illiteracy,

and it was found that, as a matter of fact, wherever trachoma is particularly prevalent the degree of illiteracy is very marked.

In eastern Tennessee the disease is also found. There is very little in Georgia, and only in three contiguous counties adjoining South Carolina and Tennessee. The largest number of cases is found in the counties bordering and close to the Kentucky State line. A large number of the cases seen were in the incipient stage, and had previously been unrecognized. These incipient cases form a dangerous type from an epidemiological standpoint, as they are more able to cause a spread of the disease than the older cases, there being no effort made to avoid contact with such persons. Here, again, there was no relation to be traced between foreign immigration, and the Negro was found practicaly free from it except in a locality where the infection was particularly severe.

In former years considerable stress was laid upon the fact that trachoma occurred chiefly in the mountainous districts, and at one time it was thought that the physical features of the country might have something to do with the occurrence of the disease. From the various studies that have been made it was seen that this fact is only of importance as it influences the life of a community. In most of the States the severest infections are found in the most isolated parts of the State, and, with these as the foci, the disease has spread along the lines of travel. The reason of its being more prevalent in these localities is due to the insanitary conditions of the homes, the lack of observance of even the simpler rules, and particularly the lack of medical services in the diagnosis and treatment of the disease. In the absence of any knowledge upon the subject of trachoma the disease has been allowed to spread without any attention. The use of the common towel in boarding houses, cheap hotels, railway stations, and trains, perhaps contributes to the spread of the disease.

Where trachoma has got a foothold the only way to eradicate it is by systematic effort, which should begin with a campaign of education, especially through talks to school children and the distribution of printed literature concerning the danger of the disease and how to prevent it. Systematic examination should be made of all children, and all with active trachoma should be excluded from the schools until they are no longer a danger to others. Where it is possible to employ one, a school nurse visiting the homes of the children found to be infected will be found a great help. The nurse, in these cases, can see that the treatment is carried out and can educate the family in each case in regard to it. This is of particular importance, inasmuch as one case of trachoma is rarely found in a family; almost invariably several members are found with the disease.

The disease could be combated best, perhaps, by some sort of foundation similar to the Rockefeller Foundation for the eradication of

hookworm. But until some such foundation shall be made by some philanthropist there should be a systematic cooperation between the health authorities of the Nation and the States.

SANITATION OF SWIMMING POOLS.

WALLACE A. MANNHEIMER, College of Physicians and Surgeons, Columbia University.

(*Journal of Infectious Diseases, July, 1914.*)

GENERAL RECOMMENDATIONS.

1. Construction and equipment.—Pools should be constructed of smooth lining without crevices and should be of as large capacity as possible. There should be no obstruction of any kind in the water, a combination of life rail and overflow ledge making this possible. Where feasible, the plunge should be constructed on the top floor of the building, so that the water used for flushing purposes could be taken from it. The fresh water usually employed for this purpose should be added to the pool instead. Each establishment should be provided with adequate shower baths and convenient dressing rooms and toilets.

2. Source of water supply.—The water used in swimming pools should be pure. Where this is not possible, it should be thoroughly purified before use by the methods indicated.

3. Management of the water.—The water should be thoroughly filtered before passing into the tank, so that the opacity of the water could not obscure a submerged person. The water should be changed frequently and as much dilution water added as possible. These two procedures in themselves, however, are of little importance if refiltration and chemical disinfection are used.

Refiltration is an efficient and economical method of keeping water clear during protracted use.

4. Chemical disinfection.—Calcium hypochlorite, used in amounts controlled by appropriate tests, has been shown to be efficient for the disinfection of swimming-pool water, and its application to the water in conjunction with refiltration is urged as a most effective method of pool sanitation. There are two simple ways of adding the chemical to the water; (1) Small cheesecloth bags containing the hypochlorite may be strung along a pole of sufficient length to reach across the pool and then dragged back and forth till the contents are dissolved. At the end of a half hour the amount of chlorin remaining in the water should be measured (as previously described) by the man in charge. In the event of too much chlorin being added, the water of the pool might be diluted by sending in a stream of fresh, warm, filtered water. If too little hypochlorite has been added, the process

of treatment should be repeated. (2) If the pool is to be subjected to refiltration, the above procedure could be modified and simplified. Instead of treating the pool by means of cheesecloth bags, a small mixing and feeding chamber could be made and attached to the intake pipe, and the water, after refiltration, continuously treated with hypochlorite. The question arises whether or not the slow gradual addition of the chemical is as efficient as is the rapid periodic method. With the slow method the concentration of the hypochlorite is never great, while with the rapid the sudden increase of the chemical concentration is sufficient to cause rapid bacterial destruction. When the chemical is added slowly, however, the time of its contact with the bacteria is accordingly prolonged, and this explains the equality in the efficiency of both methods.

Comparing pools where one or the other method is employed, we find that the slow gradual addition of the chemical seems to be superior. This latter method also, however, should be controlled by tests. The attendant in charge, therefore, should take samples for examination. The amount of chlorin in the water will indicate to him its approximate purity, and should there be any unusual deviation from the reaction described below, it can easily be corrected. This method of using refiltration and chlorination appears to the writer to be the better for the following reasons: (1) The clarity of the water throughout use would be maintained and its sanitary condition improved; (2) the water could be used for several weeks, with an elimination of the necessity for cleansing the floor and sides of the pool, at the same time cutting down the great waste of water and the amount of coal used for heating purposes.

A simple method for testing the amount of chlorin in water is as follows: To a liter of water in a flask, held over a white tile, should be added a mixture containing a crystal of iodid of potassium, a few drops of acetic acid, and a teaspoonful of starch. The proper end reaction to be obtained is a violet blue. If a darker color is obtained, too much chlorin is present; if a lighter, not enough is present.

After emptying the pool, its floors and sides should be washed with antiseptics (chlorid of lime, formalin, etc.), as pools not employing this precaution are frequently polluted prior to use.

5. Administration.—Students and patrons should be subjected to physical examinations before admission to the plunge, and all diseased persons excluded. A set of rules should be given covering the important items of sanitary conduct in the water, e. g., the importance of showering before and after bathing, the importance of taking sitz showers with soap, of abstaining from expectorating into the water, the importance of emptying the bladder before entering the pool, etc. Patrons and students should be compelled either to

bathe nude or to use clothing the cleanliness of which has been approved by the director.

In a plant properly managed the filters during use should be frequently reversed, thus washing the accumulated dirt into the sewer. When filling the pool, reversing every hour is usually found necessary. When refiltering the water from the pool, the reversing at least twice a day is necessary. The workmen in charge of the filtering plant and those employed to clean the pool should be carefully supervised.

VULVOVAGINITIS AND SCHOOL TOILETS.[1]

RICHARD M. SMITH, M. D., Boston.

(*American Journal of Diseases of Children, April, 1915.*)

The medical profession is just beginning to realize the great number of endemic cases in the cities and the difficult nature of the problem. The health commissioner of New York, Dr. Goldwater, has recently made a preliminary report on the question, of which the following is an extract:

> That a form of vaginitis which is bacteriologically indistinguishable from gonorrheal vaginitis is a common condition among children in this city and elsewhere is well known to clinicians.
>
> If a serious attempt were made to exclude from school all children who suffer from vaginitis, it would be necessary (*a*) to establish the machinery by which a complete physical examination of all female children could be made; (*b*) to convince the public of the necessity of the proposed measure; (*c*) to establish the legal and moral right of the city authorities to require such an examination. Furthermore, inasmuch as the condition in question is one which, notwithstanding the most intensive treatment, often persists for months and even for years, it would be necessary to inaugurate a method by which the education of excluded children could be continued. The only logical method would be to send private teachers into the houses of infected children.
>
> The questions here involved are among the most difficult and puzzling with which public health administrations have to deal. I am not aware that the problem has been solved anywhere, and can only promise, on behalf of this department, unremitting attention to it, in the hope that a working program may ultimately be formulated.

Taussig writes that "gonorrhea in little girls * * * is simply the result of inadequate sanitary precautions," and offers the following suggestions "as additional preventive measures for the control of this disease":

1. The instillation of a drop of 2 per cent silver nitrate solution in the vestibulum vaginæ of all new-born girls whose mothers show evidence of gonorrhea.
2. Making vaginitis in children a disease reportable to the board of health.

[1] Title of article: Literature of 1913 and 1914 of Infections of the Genito-Urinary Tract in Children.

* * * We would not be justified in excluding the children from school for eight or nine months * * *, unless there existed a special school * * * where [they] could be given * * * instruction.

3. Instruction of parents of infected children through the visiting nurse regarding preventive measures to limit the infection.

4. Investigation by the visiting nurse as to the probable origin of the infection in each case, with a view to excluding this factor from contaminating other children in the same house.

5. The adoption of a U-shaped seat with low bowl and other precautionary measures to prevent the spread of infection through the public lavatories in schools, playgrounds, comfort stations, and tenements. I consider this last-named suggestion the most important of all * * *.

Taussig, also, as well as Barnett, advises the use of paper coverings for lavatory seats.

These are the most radical recommendations yet made. Most authors content themselves with keeping the children out of school for a week or two, and warning the teachers and school nurses when they go back that they are not to use the toilet. G. G. Smith adds that with "this danger removed [i. e., the common toilet] they are less likely to be a focus of infection while in school than when playing untended on the street."

THE CUTANEOUS TURBERCULIN TEST IN CHILDREN OF NON-TUBERCULOUS PARENTAGE.

MAURICE FISHBERG, M. D., New York University and Bellevue Hospital Medical College.

(*Archives of Pediatrics, January, 1915.*)

In an investigation[1] made by the present author two years ago, it was elicited that in children of tuberculous parentage the percentage showing positive reactions to the cutaneous tuberculin test was about the same as that reported in Europe. At present I am in a position to report about a similar investigation among children of nontuberculous parentage.

During the past summer I applied the tuberculin test to 588 children under 15 years of age, in whose homes there was no known active tuberculous person. The aim was to ascertain whether it is only the child raised in a tuberculous mileu that runs the risk of infection with tubercule bacilli, while children living under similar social, economic, hygienic, and sanitary conditions, but whose parents are not tuberculous, escape infection.

The children in 177 families were thus investigated. These people were all dependents, having applied for relief to the United Hebrew Charities. They lived in 536 rooms, averaging three rooms per house-

[1] See The Health of School Children. U. S. Bu. of Educ., Bul. No. 4, 1915, pp. 30–32.

hold. Altogether they constituted 832 persons, of whom 783 lived at home. The congestion was thus as high as is to be expected in families whose breadwinner is either dead or incapacitated, temporarily or permanently. They lived in the tenement district of this city, mostly in the East Side and The Bronx.

We succeeded in applying the Von Pirquet test to 588 children under 15 years of age, using pure old tuberculin for the purpose. Inasmuch as most of the parents objected to repeated "vaccinations," we only applied the test once in each case, and not twice or even three times, as was done with the children descended from tuberculous stock reported one year ago. This fact is to be borne in mind when the two groups of children are compared.

Inasmuch as none of these children were seriously sick at the time the tuberculin test was applied, it is remarkable that such a large proportion showed positive reaction. Of the 588 children, 310, or 52.72 per cent were "reactors." I feel confident that, if the tuberculin test had been applied a second time to those who did not react, the proportion of positive reactions would have been increased by 10 to 20 per cent. It is also to be noted that during the first six months of life the proportion of "reactors" is insignificant—only 1 among 22 infants. During the following six months the proportion rises, and we obtained 14.71 per cent of positive reactions. At 2 years of age the percentage rises to 33.33, at 5 years of age to even 47 per cent, and at 10 years of age to 69.77 per cent. Finally, at 14 years of age, we found 75 per cent of positive reactions.

Percentage of children giving positive reactions to tuberculin tests.

Ages.	Among children of tuberculous parents.		Among children of non-tuberculous parents.	
	Number of cases.	Per cent.	Number of cases.	Per cent.
Under 1 year of age	33	15.15	56	10.07
1 to 2 years	49	55.10	39	33.33
3 to 4 years	90	68.88	80	41.25
5 to 6 years	95	65.26	106	50.00
7 to 10 years	244	71.31	173	64.74
11 to 14 years	181	74.58	134	69.40
14 years	37	83.78	20	75.00

It appears from this table that the difference between the two groups of children is not as great as would be expected a priori. Before the sixth year of life the number infected among those who live with tuberculous parents, where the opportunities for infection are immense, and in overcrowded houses obviously unavoidable, the proportion of infected children reaches 50 per cent, as against 65 per cent among the group of tuberculous parentage. From 7 to 14

years of age the proportion of "reactors" is about the same in both groups. The slight difference between the two may be ascribed to the fact that in the group of children of tuberculous parentage the tuberculin test was aplied two or three time in those who gave negative reactions at the first and second application.

There are several problems to be discussed in connection with these findings. It is of immense interest to know whether the positive outcome of the cutaneous tuberculin test is a sure indication of infection with tubercle bacilli; if so, how have these children, living in homes in which there were no known consumptives, become infected with the tubercle bacilli; and, finally, what is the outlook for these children; are they destined to suffer from clinical tuberculosis sooner or later?

While there are many problems yet to be solved in regard to the specificity of the cutaneous tuberculin reaction, there appears to be no doubt that, in practically all cases in which it was found, positive tuberculous changes have been found in some part of the body at the autopsy. The few cases in which the autopsy has not revealed microscopic changes do not militate against this view, because slight lesions may have been overlooked, and would have been found by a microscopic examination of all the tissues of the body, which is not a feasible procedure.

The large proportion of infections with tuberculosis among the children reported on in this paper is not surprising, even if their parents have not shown any clinical evidences of active tuberculosis. The opportunities to meet tuberculous persons, especially "carriers" of tubercle bacilli, without showing any symptoms and signs of the disease, are very great in the tenement districts of New York City. We have no data as to the frequency of infections among well-to-do in this city, because no one has ever, to my knowledge, reported a large series of children of this class to whom the Von Pirquet test was applied. But to judge from my personal experience, as well as from facts to be soon mentioned, I am under the impression that even the rich, raised in healthy and capacious dwellings, with all possible care to prevent infection, have a large proportion in whom the Von Pirquet test is positive. Even if they are safe at home, they are bound to become mildly infected when sent to school; and on reaching adolescence, and coming in contact with all kinds and conditions of people, they can not escape infection.

In a previous paper on the subject I have given details of Jakob's and of Hillenberg's findings in rural communities in Germany, where no active tuberculous person has been known for long years, yet the proportion of children reacting to tuberculin was between 25 and 45 per cent. A more drastic example has recently been published by Birger Overland. In an isolated valley in the mountainous district

of Scandinavia, where no death due to tuberculosis has occurred for many years, Overland applied the Von Pirquet test to all of the 100 inhabitants, and found that 54 per cent reacted positive. From his investigations Overland considers the tuberculosis in that settlement as imported by two teachers in the village school. Bovine infection with milk was excluded by testing all the cows with tuberculin.

If a teacher in a village school can infect the majority of the children in a rural settlement, where the outdoor life and economic conditions might be expected to prevent the dissemination of the infective agent, life in tenements, in poverty and want, involving more or less intimate association with many consumptives or tubercle bacillus "carriers," which are abundant in cities, in public schools, etc., should make infection unavoidable. And so it is in large cities.

To avoid misapprehension it must be stated that all available evidence tends to show that these infections during childhood are altogether harmless in the vast majority of persons. The fact that so many give positive reactions to tuberculin and yet are healthy is sufficient proof that infection with tubercle bacilli alone is not sufficient to cause phthisis. The large number of healed, latent, and quiescent tuberculous lesions shows conclusively that in most persons tuberculosis heals spontaneously. In fact, it appears, as was shown by the present author in another place, that these mild lesions are not only innocuous, but even beneficial, inasmuch as they protect the individual from exogenous reinfection with tubercle bacilli. Persons who have not undergone a mild infection during childhood, when infected with tubercle bacilli are apt to develop hematogenic tuberculosis of a rapidly fatal type—tuberculous meningitis, acute miliary tuberculosis, acute pneumonic phthisis, etc. This is actually the case with infants, or peoples who have not been exposed to infection during childhood, and all others who offer virgin soil to the tubercle bacilli. Chronic phthisis is rather a sign of immunity; only the most vulnerable organ, the lung, is affected and this organ is only rarely affected in this manner in those who have not been "vaccinated" with tubercle bacilli during childhood.

EXAMINATION OF THE CHEST IN CHILDREN.

RICHARD M. SMITH, M. D., Boston, and CLIFFORD D. SWEET, M. D., Fresno, Cal.

(*American Journal of Diseases of Children, September, 1914.*)

The importance of the examination of the chest in children was forced on our attention in the children's department of the Massachusetts General Hospital because of the large number of patients brought to us by school nurses and friendly visitors to determine whether or not tuberculosis was present. It has been our custom in

doubtful cases, in addition to the customary physical examination, to do a Von Pirquet skin reaction and to have a roentgenogram made of the chest. We have recorded also the weights and tried to secure the morning and evening temperature. The same methods of examination have been employed in other patients having symptoms pointing to disease of the lungs. We have tabulated the results of our studies in 100 cases; all of these patients have been examined by one of us, and nearly all of them by both of us. The course of events has been followed for many months in most of the children, so that our diagnoses have been proved. A few cases have been seen for the first time within a few weeks. The primary interest in this connection is and will remain, of course, in determining the presence or absence of tuberculosis, but if we are content to leave the matter there, many important conditions will be overlooked. It is essential also to bear in mind the distinction between tuberculous infection and active tuberculous disease. The prevalence of healed tuberculous lesions found on post-mortem examination is too well known to need discussion. Tuberculous infection can be determined ante mortem in most instances, but this does not mean that the individual so infected has active tuberculous disease and needs to undergo treatment. * * * The ages of our patients varied from 1½ to 13 years. The majority were from 5 to 10 years. [Then follow discussions of clinical data, comparison of lung signs and the Roentgen ray, bronchial glands, and Von Pirquet reaction.]

The analysis of these cases has shown that only 7 out of 100 suspected cases had active tuberculosis; that 63 had evidence of tuberculous infection, 56 of which are now in a quiescent state, and that 37 had no evidence of tuberculosis of any kind. It is important to find the cases of active tuberculosis and give them proper care. It is equally important to be sure that this diagnosis is correct. Patients with old inactive scars of tuberculous infection should not be treated as cases of active tuberculosis. A considerable number of children suspected of having tuberculosis will be proved to have an infection with some other organism than the tubercle bacillus. These patients need proper treatment. A part of this treatment consists in keeping them away from exposure to tuberculosis either outside or in a tuberculosis sanatorium. These patients deserve and should receive the most careful consideration.

THE PROBLEM OF INFECTION IN TUBERCULOUS FAMILIES.

JOHN B. HAWES, 2D, M. D., Boston.

(*Boston Medical and Surgical Journal, July 30, 1914.*)

This paper is based on a study of 600 patients, discharged from the North Reading, Lakeville, Westfield, and Rutland State Sanatoria

from July 23, 1912, to October 16, 1913. Miss Billings visited these patients once shortly after their discharge and again later on if necessary. The great majority of them, approximately 83 per cent, were in the advanced or moderately advanced stages of the disease at entrance to the sanatoria, where nearly 50 per cent, much against the superintendent's judgment, were discharged with positive sputum and with the disease still active. These 600 patients, including in these figures only the immediate members of the family, exposed 2,601 others to this disease. Of these 2,601 individuals Miss Billings found that only 597, or 23 per cent, had ever been examined for tuberculosis, despite the fact that at the patient's admission to the sanatorium his physician, as well as the local board of health, was at once notified, so that the other members of the family might be examined. Of these 597 exposed patients who were examined, 75, or 12½ per cent, were found to be positive cases of consumption. There were 966 children 15 years and under among these exposed individuals. Of these, 362, or 38 per cent, had been examined, and 38, or 10½ per cent, were found to be positive cases. These figures are shown in the following table:

TABLE 1.—*Six hundred patients visited between July 23, 1912, and Oct. 16, 1913.*

Total number of persons exposed	2,601
Total number of persons examined	597, or 23 per cent.
Total number of persons found to have consumption	75, or 12½ per cent.
Total number of children exposed	966
Total number of children examined	362, or 38 per cent.
Total number of children found to have consumption	38, or 10½ per cent.

A study of the first 200 patients of this group as compared with the last 200 is of interest. The two following tables show enough improvement as the result of Miss Billings's work to encourage us to further effort:

TABLE 2.—*First 200 patients visited between July 23 and Nov. 20, 1912.*

Total number of persons exposed	871
Total number of persons examined	170, or 20 per cent.
Total number of persons found to have consumption	25, or 14½ per cent.
Total number of children exposed	295
Total number of children examined	161, or 54 per cent.
Total number of children found to have consumption	11, or 7 per cent.

TABLE 3.—*Last 200 patients visited between April 22, 1913, and October 16, 1913.*

Total number of persons exposed	824
Total number of persons examined	243, or 30 per cent.
Total number of persons found to have consumption	13, or 5½ per cent.
Total number of children exposed	319
Total number of children examined	153, or 48 per cent.
Total number of children found to have consumption	8, or 5 per cent.

Although the totals are not very large these results are too striking and show too uniform a tendency in the right direction to be altogether a coincidence. In each group of 200 patients, the total number of persons exposed is nearly the same. The proportion of those examined for tuberculosis rose from 20 per cent in the first group to 30 per cent in the second; while of those examined the percentage of positive cases dropped from 14½ per cent in the first group to 5½ per cent in the second. Likewise with the children exposed, in the first group of those examined 7 per cent were found positive, while in the last group only 5 per cent were positive cases. The class of patients during this time has not changed. There are just as many advanced cases with positive sputum among the last group as among the first. The work we have done among these patients is not of course the only factor in this improvement, but it is one factor and, I believe, an important one. The individual work with patients which Miss Billings has done, although in itself admirable, is not so important as what she has accomplished in getting after local authorities in a tactful way and trying to persuade them to accept their own responsibilities.

THE SUSTAINED INTEREST IN THE PROBLEM OF TUBERCULOSIS.

(Editorial in the Journal of the American Medical Association, March 6, 1915.)

The National Association for the Study and Prevention of Tuberculosis reports that $20,700,000 was spent last year in combating this disease in the United States. Notwithstanding the immense sums expended, it is doubtful whether we are getting our money's worth in lowered death rate, which is, after all, the final criterion by which the success or failure of the antituberculosis campaign must be determined. The seriousness of the problem is recognized by leaders of thought and activity in other vocations than medicine. Notable among these is Gov. Craig, of North Carolina, who devoted a considerable portion of his annual message to the subject. His State has 18,000 cases of tuberculosis known to the health authorities. He estimates that the entire revenue of the State would be insufficient to care for all its tuberculous victims in sanatoriums, and he urges that some means be found to help those who can not be accommodated in institutions.

Most of the legislation so far enacted for the control of the disease has tended to exaggerate the dangers from casual exposure, and to emphasize the value of segregation in sanatoriums at the expense of every other consideration. Evidence accumulates daily that tuberculosis is a house infection, or family disease, and that the proper

way to stamp it out is to remedy the home conditions which predispose to it. That it is preeminently a disease produced by intimate rather than casual contact is shown by recent investigations of the Public Health Service and also by Pampson's survey of tuberculosis families made for the Minnesota State Board of Health. Carrington, Foster, and Sweet, of the Public Health Service, studied the influence of the migrant consumptive on the health of the community to which he moves. These studies were conducted in North and South Carolina, Texas, and New Mexico, and in none of the communities frequented by tuberculosis persons in search of health was there the slightest indication of the spread of the disease from them to the native population. Lampson's investigation of the spread of the disease was an intensive study of tuberculous families in five Minnesota counties. A list was made of all deaths from tuberculosis for the year 1911 and previous to August 1, 1912, and the surviving members of the families were then examined for evidences of the disease. Whenever there were no tubercle bacilli in the sputum, or positive physical signs, the Von Pirquet test was used. Ninety-seven families were studied, and for individual members of those families 449 charts were made, which indicated the findings under the following heads: Name, sex, age, nationality, social condition, school attended, height, weight, general appearance, nutrition, exposure, lungs, bones, joints, skin glands, sputum, pulse, temperature, and respiration. These results were tabulated to show the amount of infection from (*a*) complete exposure, that is, intimate exposure for a long time; (*b*) partial exposure, when the patient was away for part of his illness, or members of the family were away during that illness; and (*c*) doubtful exposure, when reported death was apparently from some other cause than tuberculosis.

While the amount of material is not large, the striking uniformity of results in the different locations adds weight to the findings, which were substantially as follows: Complete exposure of families resulted in a positive Von Pirquet reaction in 79 per cent of the surviving members of those families, whereas in partial exposure the positive reactions were only 28 per cent. In those classified as doubtful exposures, the positive reaction was still less frequent, only 8 per cent of these showing evidences of infection. In the families exposed to pulmonary tuberculosis, 70 per cent of the members showed signs of infection, and in those exposed to nonpulmonary tuberculosis 32 per cent, while in the nontuberculous families only 8 per cent presented any evidence of the disease.

In view of the increasing evidence that both the predisposing causes and the successful treatment of tuberculosis are inseparably bound up with the problems of the home, it is to be hoped that at

least a part of the sustained interest in the subject will be directed toward a rehabilitation of tuberculous families rather than ill-advised segregation of individual members.

INFLAMMATORY PATHOLOGY OF THE TONSIL.

BYRD CHARLES WILLIS, M. D., Johnston-Willis Sanatorium, Richmond, Va.

(*Southern Medical Journal, September, 1914.*)

The pathological findings in this paper are based on the macroscopical and microscopical study of 108 cases, 213 tonsils, operated by Drs. Wright and Bowen and the late Dr. R. L. Edwards from October, 1911, to November, 1913. In three cases only single tonsils were studied. All of these cases except 10 were done under ether anesthesia, with no fatalities and with only one case of secondary hemorrhage, which was never alarming. The operation performed was a complete tonsillectomy by instrumental dissection and snare method, the capsule being removed in all except 14. The tonsils were in one piece in nearly every case, and the capsule was found in place in 109. Very careful examination was made for muscle attachment to the capsule, which was found present in 53 cases. Microscopically it was found present in nearly every case to a greater or less degree, but in no case in sufficient amount to seriously impair the function of the oropharynx.

The patients were from 2 to 35 years of age, excepting one patient, aged 54; 43 were males and 65 females. Of these tonsils, 144 were classified as large and 69 small; 25 were submerged, 74 partially so, and 114 free; 144 had deep crypts, and 17 were so distorted as to appear grossly not to have any crypts. This point was not searched for in the early series. Twenty-five were seen to contain concretions on section. No effort being made to express the concretions, there were fewer found than might have been present. Microscopically, concretions were seen in 154, abscesses in 30; connective tissue increased in 164 to a more or less extent, some almost entirely sclerosed. One hundred and eighteen showed fibrin; especially was this true where connective tissue was on the increase. In 28 there were foreign inclusions; the most of these consisted of solid hyaline desquamated epithelial plugs. These may be accounted for by islands of epithelium being cut off in an arm of a crypt by previous inflammatory process and thereafter the epithelium being retained. Three contained islands of cartilage. One hundred and ninety-eight showed evidence of chronic inflammation. Pericryptal inflammation in 165. This was usually found at the bottom of the crypts, which contained concretions, and consisted of round cell infiltration of the surrounding epithelial layers and lymphoid tissue. The epithelium in many cases had been ulcerated or lost, and in 30 tonsils actual abscesses had

formed. These concretions consisted of decomposed food, desquamated epithelium and leucocytes.

The germinal centers were large or normal in 184, small in 38, and not found in 19. Ten tonsils were tubercular and in one case the disease was bilateral. Only one case had no cervical glandular enlargement; the other eight cases had cervical glands from size of almond to walnut. Unless several sections of suspected tonsil are studied, the tubercular lesion is apt to escape detection. From one to six areas of these tonsils were examined before the involvement was discovered. Many of these cases had typical tubercular lesions extending down to the capsule and only a part of the respective tonsil involved, hence a tonsillotomy would not be sufficient to remove the disease. These patients have all been very carefully examined for pulmonary involvement, but no appreciable change found, and their subsequent history has sustained the above negative findings.

THE RELATION OF TONSILS AND ADENOIDS TO THE DEVELOPMENT OF THE CHILD.

D. Braden Kyle, M. D., Philadelphia.

(*American Journal of Diseases of Children, March, 1915.*)

The subject of tonsils and adenoids in children is always interesting to the pediatrist, especially from the point of view of their relation to the mental and physical development of the child, and has received considerable attention during the past year.

In the first place, the tonsillar and adenoid tissues are physiologic structures, and their relation to the mental and physical development in children is of extreme importance. The position of the tonsil is such that, owing to its size and location or the fact that it is embedded or adherent or pathologically altered, it will interfere with the mechanism of phonation, and therefore in early life bear an important relation to the development of speech, and if diseased it will in turn affect physical development.

These glandular structures are apt to be large in children, so that at the formative age in which the child is learning to talk any abnormality of this structure or any interference with the mechanism of phonation may cause defects of speech, or, rather, peculiarities of speech, which will be detrimental to the development of the child.

Children, as well as adults, are very impressionable and extremely sensitive to ridicule, and a child is very quick to notice that it has difficulty in saying words correctly, or that it has some defect of speech caused by the presence of the tonsil or adenoid, which gives a peculiar intonation. To the child its own voice is natural, and it is only by comparison with others that it notices the peculiarity. Such

peculiarity may lead to so-called backwardness, not that the child has any deficient mental capacity, but that on account of the interference with the mechanism of phonation and the fear of ridicule and of being laughed at by its little playmates or schoolmates, the child would rather admit that it does not know than to use its voice and be the subject of ridicule. Such defects are frequently observed in children from 3½ to 6 or 7 years of age.

The same is equally true of the adenoid structure. We know that children who have a large adenoid growth and who are mouth breathers have very poor enunciation. They have lack of nasal resonance and difficulty in enunciating, especially in certain sounds and words. Besides, there is a certain mental hebetude observed in children who have this adenoid growth. There is also a peculiar relation to the mentality of the child suffering from enlargement of this gland. Drs. Harrison Allen and J. Solis Cohen were the first, I believe, to call attention to the intimate relation of this gland structure to the brain and meninges.

The child's mentality may be normal, but it would require more effort to attain development in such a child than in one in whom the adenoid structure does not exist or in whom it is not obstructive.

The child who has enlarged adenoids frequently shows a backward manner, timidity, lack of confidence, and in some instances, on account of the interference with the eustachian tube and middle-ear involvement, feels an uncertainty as to equilibrium, is a little uncertain in his gait, and feels at a decided disadvantage. This child is also handicapped by the facts that nasal respiration is interfered with, the respirations are entirely through the mouth, and the physiologic process of aeration does not fully take place. This in itself renders the child below par in its physical condition and handicaps it mentally.

While the defects in speech, which are purely mechanical, are not exactly the same as in the enlarged and imbedded or adherent tonsil, yet the effect on the child is practically the same. The child is unable to recite as the other children do, and notices very quickly the ridicule of its classmates, and, besides, I am sorry to say, frequently the impatience of its teachers and also its parents. Some children are discouraged by comparisons.

With the removal of the adenoid tissues early in life and a little training on the part of the parents and teachers, it will be found that the child's capacity is equal to any other, and that the handicap was purely a mechanical one.

Usually the pharyngeal tonsil attracts the general practitioner's or specialist's attention only when it is the site of some pathologic process or when from its physiologic growth it becomes sufficiently

large to obstruct nasal respiration and interfere with the development of the nasal and facial bones.

In early infancy the tonsil is rarely affected, but in early childhood it too often causes trouble mechanically and systematically.

The tonsil becomes pathologic only when its presence injures the individual, either locally or generally, not because some one discovers a pair of tonsils in that throat. The submerged tonsil, which may be quite small, is more liable to be doing harm than the fairly large, free tonsil. It is only in the last few years that the tonsil has been judged pathologically otherwise than from its size alone. The tonsil that is more or less submerged is the one that nearly always is to blame for the infective processes about this region and in the neck and from the neck to the general system.

A submerged tonsil that extends well up into the velum, diseased or not, may cause interference with the normal function of the eustachian tube and, indirectly, with the middle ear, producing tubal catarrh or one of the acute or chronic catarrhal or suppurative inflammations of the middle ear. By pressure alone it will interfere with hearing, even before its presence has caused inflammatory action. The tubal adenoid, that portion which sometimes is found in the eustachian orifice and often overlooked in operation, may be the direct cause in early life of serious ear involvement later.

The embedded tonsil and the adherent tonsil also affect the child's general physical condition, as we all know, owing to the fact that the crypts and pockets formed behind such tonsils always permit of absorption into the lymphatic system of toxic material from the tonsil, which interferes with the general health and physical condition and in turn would necessarily create a mental handicap. The child is below par, peevish, fretful, and irritable, and lacks the energetic vitality of childhood.

The adenoid-gland structure is particularly susceptible to inflammatory action, and the slightest inflammatory change in this structure will produce in children marked rise in temperature, with all the associated febrile phenomena. Frequently we have to deal with febrile conditions in children in which there is no apparent cause for the symptoms present, and the cause of such temperature, with the accompanying systemic phenomena, could be traced directly to the inflammatory condition of this adenoid structure. In any case in which there is the slightest infection, with inflammatory condition of the adenoid structure, the systemic phenomena are all out of proportion to the local cause, the gland seems to rapidly absorb any toxic material, and the temperature suddenly rises before there is any very marked constitutional effect.

Children with adenoid structure are more susceptible to cold and the diseases of childhood than those who do not have it, and the

symptoms produced by the cold are aggravated in proportion to the amount of gland structure present.

It is vastly important, then, in many instances, not only from a point of view of physical development, but from a point of view of mental development, that these mechanical interferences with phonation, such as embedded or enlarged tonsil or the obstructive adenoid, be corrected early in life, before habits are formed and fixed; otherwise the child grown to adult age will go through life handicapped both mentally and physically. Extreme care should be taken in correcting these defects that the muscular structure of the soft palate and pharyngeal pillars are in no way injured, and thereby prevent the formation of any scar tissue which would involve the mechanism of phonation later in life.

The lack of attention, aprosexia, and lowered power of memory, resulting from typical adenoid obstruction and irritation, are responsible for an enormous amount of backward and deviate mental development originating in infancy. The child is unable to apply himself to his prescribed work. Thus handicapped, he falls behind his fellows and fails to catch up; he is accounted a dunce; he is punished by his teachers and parents, ridiculed by his mates, and soon finds other matters to take his attention. He grows sullen, apathetic, or mischievous, and is considered incorrigible and a nuisance.

From a modern point of view hypertrophy of the lymphatic ring of the upper air passages, together with high arched palate, hypertrophy of the thymus, with the associated deviation of other structures from the normal, are considered among the stigmata of degeneracy, and therefore to be referred to the same hereditary or acquired influence that results in hypoplasia in general. Certain it is that the hypoplastic infant is peculiarly afflicted with hyperplasia of the glands in question. The hypoplastic child, fundamentally unstable and still further handicapped by enlarged tonsils and adenoids, with their attendant train of evils, is prone to respond nervously in an exaggerated degree to harmful environmental influences and needs careful study and attention to insure the advancement of which he is in a great number of instances capable.

THE INVOLUTION OF THE NASOPHARYNX, AND ITS CLINICAL IMPORTANCE.

W. Sohier Bryant, M. D., New York.

(*American Journal of the Medical Sciences, July, 1914.*)

The vulnerability of the nasopharynx—that gateway of almost all human diseases—is due to three causes: Man's assumption of an upright position, the growth and development of the brain, and the retrograde metamorphosis of the nose, face, and teeth of man.

Too much emphasis can not be laid on the facts that almost all diseases are air-borne; that the particles which carry the disease pass through the air to the recipient; that this passage is made comparatively easy because of an exposed and unprotected part of the air tract; that the bacteria, whether they come from the mouth or through the nose, cling to this unprotected spot, develop here, and thus the disease begins. This unprotected spot is the nasopharynx; therefore, clinically, the care of the nasopharynx is of supreme and inestimable importance.

The reasons for our estimate of the supreme importance of the nasopharyngeal region are:

1. In many diseases the primary symptom is found in this locality.
2. The secondary symptoms are traceable from the nasopharynx.
3. The management of the nasopharyngeal region controls the distant manifestations of the disease.
4. The individual's immunity from disease is in direct proportion to the resistant power of the nasopharynx.
5. Man is more subject to air-borne diseases than quadrupeds.

The reason for this is that in quadrupeds the nasopharynx has no unprotected spot. In general, the infections of animals gain entrance through the alimentary tracts or skin, whereas with men infections enter through the air tract.

Clinically, primary affections of the larynx, trachea, and lungs form an extremely small proportion of the affections of the air tract. Therefore the great bulk of infections must take place through the upper air tract. The nose is known to be extremely resistant to infections; this is fortunate, as the nose serves as the outpost and occupies a most exposed position. The oropharynx is of more importance, and to it can be ascribed a number of primary infections. But we do not find the portal of entry of the bulk of infections until we reach the nasopharynx. And we find it there because in the nasopharynx is an unprotected spot which, while it becomes a culture medium for bacteria, furnishes a gateway for the entrance of the infection into the individual.

The epithelial lining of the nasopharynx is tall, columnar, ciliated epithelium near the nasal boundary and stratified squamous epithelium in other parts, with a variable intermediate region of non-ciliated columnar epithelium. The walls of the nasopharynx are generously supplied with lymphoid tissue. This lymphoid tissue, which is spread over nearly the whole of the walls of the nasopharynx, is very much thickened over the central and posterior part of the vault of the nasopharynx, forming several parallel sagittal ridges, with a deep sulcus in the median line. This mass of lymphoid tissue forms the two lobes of the tonsil of Luschka, or first tonsil. The pharyngeal bursa lies between the lobes of the first tonsil.

This mass of adenoid vegetation is found in a corner formed by the bending of the posterior pharyngeal wall at the angle of the nasopharynx. Here the respiratory current is bent at right angles, necessarily forming eddies, and thus providing a place where the air current slows down, favoring the lodgment of floating particles.

The angle is the point where the momentum of the floating particles and the slowing down of the air current favor their sticking to the wall. At this place, also, the ciliated columnar epithelium continuous with the ciliated epithelium of the nose changes into nonciliated pavement epithelium. This epithelium, since it has lost the cleansing power of the peristaltic collapsible nasopharynx of the quadruped, has no means by which to free itself from foreign material except through the uncertain flow of mucous secretions.

The oropharynx is provided with many strong muscles which act in coordination in peristaltic contraction of the oropharyngeal tube during the act of swallowing, thus squeezing out and carrying off adherent mucus and foreign material. The upper limit of this peristaltic tube is the soft palate.

The soft palate, when contracted, forms a diaphragm between the oropharynx and nasopharynx in man. The nasopharynx lies above the soft palate and the peristaltic tube which the soft palate forms with the oropharynx, and consequently the nasopharynx can not be cleaned by muscular contraction. The nasopharynx is therefore dependent upon its ciliated epithelium to keep it clean, and to the flow of excreted mucus to wash off foreign material from the pavement and columnar epithelium lacking in cilia.

Just in this region, at the point of the bending of the respiratory current, between where the esculator takes up its burden and where the tube conveyer commences—that is, between these two mechanisms—is located the general dump, cleaned only by a precarious flow of mucus. This general nasopharyngeal dump is at the point where the "adenoid" is located. This locality, on account of its lack of protection, serves not only as the point of entry for bacteria, but also as a culture medium, where the bacteria can develop almost without hindrance. The virulent toxins which they produce may cause disturbances at distant points.

The pharyngeal tonsil, or first tonsil, appears from its position to be mechanically the most vulnerable point in the air tract, and if in the air tract, then in the body. A mass of lymphoid tissue protects it and probably serves as a barrier to the entrance of infectious organisms. Infections of the upper air tract occur oftenest in Waldeyer's ring, and in the pharyngeal tonsil more often than in any other part of the ring.

The typical changes in the course of an acute infection through the adenoids are characteristically shown in acute rhinopharyn-

gitis. The onset is expressed by increased secretion, congestion, and swelling of the adenoid. The reaction spreads and increases in violence according to the course of the infection.

A constant characteristic in chronic inflammation, having its origin in the upper air tract, is shown in the swelling, increased secretion, altered blood supply of the first tonsil, and the conspicuous absence of subjective symptoms.

In the first, or Luschka tonsil, as has been previously recognized in the faucial tonsil, an infection may be localized and very active; or, again, it may be extremely insignificant locally, whereas the distant effects acquire a dangerous importance.

Air-borne infections.—Diseases due to air-borne infections enter the human body in three ways: Through the respiratory tract, through the skin, and through the digestive tract. The diseases entering through the nasopharynx are in the maximum both in number and in importance. As scientific observations multiply, significant additions are being made to the list of infections entering through the air tract. This list now comprises the exanthemata, and nearly all diseases due to the local or distant effects of bacterial parasites. The only exceptions are the few diseases caused solely by the entrance of the pathogenic microorganisms directly into the tissue or through the walls of the alimentary canal and genito-urinary tract.

MOUTH INFECTION AS A SOURCE OF SYSTEMIC DISEASE.

C. H. Mayo, M. D., Rochester, Minn.

(*Journal of the American Medical Association, December 5, 1914.*)

It has taken a long time for the general public to appreciate the full rôle of infection in the production of death, while even in the medical profession more has come from the study of infection in the prevention of disease than in increasing the means of cure of disease, great as have been the results of treatment.

Since all animal life depends on some other form of cell life, vegetable or animal, it seems but the part of all life to carry on this process of germinative development and maturity. It is only the resistance of healthy cells that prevents the inroads of the myriads of ever-present bacteria and animal parasites which are striving to get a foothold that they may in turn carry on their life work. Disease, then, is an inflammatory process from infection and the efforts at repair. It may also be chronic from the failure of cell life, through lack of defense, from defective nutrition, and advancing age.

We still speak more or less lightly of the so-called diseases of childhood, and the time is not far past when mothers took their children to be exposed to whooping cough, mumps, etc. To-day

the intelligent woman knows that it is not necessary that the vitality of the child should be jeopardized by such preventable diseases, and that when they occur it is through carelessness, neglect, or ignorance on the part of some one.

A comparatively small number of infections occur through wounds of the cutaneous surface. Many of those affecting the special organs are incurred through direct or indirect contact, as those of the eye and of the genito-urinary system. They may make most serious inroads on the general health. Infections which produce the greatest number of diseases enter the system by way of the alimentary and respiratory tracts. Somewhere in the line, then, of the alimentary and respiratory tracts and in the excretory ducts of the body lie the sources of the entrance of organisms which terminate life in the majority of instances. The great importance of the well-known diseases of the nasal passages, with their sinuses, the lymphoid tissue of the pharynx, including the tonsils, and the disease of gums and teeth, which have been given prominence by the dental profession during the last three years, is now more generally appreciated.

The mouth is the harbor of many varieties of bacteria, which are constantly taken into the stomach during the process of eating. We have long looked on the acids of the stomach as destructive to such bacteria, but Smithies, in a microscopic examination of gastric extracts from 2,406 different individuals with "stomach complaint" (dyspepsia, indigestion, and the like), showed that, irrespective of the degree of acidity of such gastric extracts, bacteria were present in 87 per cent. Morphologically, cocci and diplococci were present in 83 per cent; short and long rods (often of the colon group) in 58 per cent; typical streptococci and staphylococci in 17 per cent; and Leptothrix buccalis in 24 per cent. In 54 cultural studies of saliva from "dyspeptic" patients, streptococci and staphylococci were demonstrated in over 80 per cent, bacilli in 66 per cent, and Leptothrix buccalis in more than 14 per cent. Comparing these figures, it would appear that the common forms of pus-producing organisms (streptococci and staphylococci) have their proliferation retarded in gastric juice, but that bacilli (often of the colon group), as well as Leptothrix buccalis, thrive in the stomach.

Bacteria of various forms live in the small intestine, or at least pass through it or into the blood stream by way of the mucous membrane. They exist in such numbers in the large bowel that, whether living or dead, they constitute a considerable bulk of the dejecta. During the last few years some important points have been added to our knowledge of bacteria. Living germ life in the blood, or bacteremia, occurs in all infectious diseases. According to their number and virulence, the blood responds in slight or extreme degree to the symptoms, general and local, constituting the disease.

We have long known that bacteria were specified in type and action in all diseases in which we have been able to identify a specific germ. Rosenow has done a great work in showing that changes in environment may so change bacteria that specific action varies. The appearance of the bacteria is also unlike that of the original cell. In the blood stream these various forms, once they enter it, are selective in choosing their location, thereby developing specific local disease. The old "idiopathic" osteomyelitis of the child, we now know, may follow a short time after a specific tonsillitis. Pyorrhea, tonsillitis, or sinus disease may be the source of an infection which we call rheumatism. Root abscesses and pus pockets connecting with them are often the source of acute and chronic rheumatism. The nasal sinuses and chronic mouth and throat infections develop anaphylaxis from the constant poisoning, and their results are shown in hay fevers, asthmas, urticarias, etc. Rosenow's work is going far to show that ulcerations of the stomach are conditions in which the mucosa is attacked from behind, through the blood stream, by bacteria which live in the blood and have a selective affinity for these particular areas. Septic bile, which in the majority of instances is caused by infection, is carried to the liver through the portal circulation. It creates such changes in the bile that it fails to activate the pancreatic and duodenal secretion, thus making various phases of indigestion, with qualitative rather than quantitive food trouble. Lower down we have the appendix, with its lymphoid tissue, which approximates in character that of the tonsil. Here the acid types of bacteria have the same opportunity, could they but enter the blood stream, of making erosions of the gastric mucosa as the specific form which is found in the mouth. We may here note that acid-secreting or acid-bathed surfaces are very subject to cancerous change, while alkaline-bathed surfaces are much less liable to be involved. Saliva is neutral or slightly alkaline in health, yet less than 20 per cent of people have healthy mouths. The infected mouth shows a tendency to the acid reaction, and it is through this acid change that we have an additional danger in cell degeneration of malignant type from chronic irritation.

The stomach is the most common location of all cancers, while the alkaline small intestine is rarely subject to cancer and the duodenum is most resistant to it. The large bowel, again, reverts to an acid reaction and is very subject to cancer. So also is the bladder. These structures, with acid secretion, are of more recent development than are many tissues of animal life, several of them being classed as organs of convenience, which fact renders them possibly less resistant.

Certainly enough is known concerning infections and their mode of entrance that the infected and diseased mouth and respiratory

tract must be looked on as most serious menaces. Much may be done by more general and effective school inspection. The present generation of children will understand and demand protection for their children in time. The first teeth should be watched, that the second be not permitted to erupt irregularly, causing deformities. Jaws should be spread, that the teeth may meet and the high-arched palate, diminishing nasal breathing, thereby reduced. Tonsils and adenoids should be looked after, thus preventing ear and mastoid diseases, rheumatism, endocarditis, etc. In chronic and recurring diseases a search must be made to establish positively the nonparticipation of each of the several sources of infection.

The physicians engaged in this line of observation require fully as much training in the rudiments of dentistry as the dentist does in the signs of infectious diseases. While we have leaders in all professions, through the energy of their kinetic glands, the big stick which leads to our advancement is in the hands of the progressive and educated public, who are constantly demanding more of their dentists, of the medical profession, and of the State in protecting them against preventable diseases.

THE RELATION OF THE LYMPHOID TISSUE IN THE UPPER RESPIRATORY TRACT TO THE VOICE.[1]

G. HUDSON MAKUEN, M. D., Philadelphia Polyclinic.

(*Therapeutic Gazette, February 15, 1915.*)

There are three ways in which the lymphoid tissue of the upper respiratory tract may affect the voice and influence its development: First, through its action as a lubricant to the pharynx; second, through its influence upon the action of the muscles employed in phonation; and third, through its effect upon the resonance chambers of the voice.

Although the lymphoid tissue in the upper respiratory tract may not be regarded as constituting what is commonly known as secretory organs, yet that it does tend to lubricate the pharynx is a fact that must be apparent to every observant clinician. Anatomists and physiologists agree in giving to the tonsils a lubricating function, and it is a well-known fact that the removal of large portions of the lymphoid tissue has a very decided drying effect upon the pharynx. One of the most annoying and even distressing sensations following tonsillectomy, especially in adult patients, is what they call a dryness in the throat which oftentimes is so great as to materially affect both phonation and articulation. The lubricating function, therefore, of

[1] See "Health of School Children," U. S. Bu. of Educ., Bul., 1915, No. 4, pp. 66, 67.

the lymphoid tissue in the upper respiratory tract must not be ignored in our treatment of this region.

The most important effect of the lymphoid tissue of the upper respiratory tract upon the voice is that relating to the action of the muscles employed in vocalization and articulation and the muscles chiefly so affected are those in the region of the faucial tonsils, namely, the palatopharyngei and the palatoglossi muscles. These two pairs of muscles control to a great degree the various positions of the other important vocal organs during phonation and articulation, namely, the tongue, the palate, and the larynx.

The palatopharyngei have been very properly called cord-stretching muscles, and they are peculiarly adapted to this purpose because of their attachments to the soft palate above and to the superior cornua of the thyroid cartilage below. The soft palate becomes more or less fixed to the superior wall of the pharynx during the emission of tone, and the palatopharyngei muscles, acting from this fixed point upon the superior cornua of the thyroid cartilage, serve to tilt the cartilage forward, thus tending to stretch the vocal cords. The palatopharyngei, therefore, are important muscles in controlling the pitch of the voice.

It is well known that obstructive adenoids and tonsils may and do interfere with the development of all the facial bones, including the alveolar arches, and through their effect upon respiration and phonation they interfere with the development of the pharyngeal, laryngeal, and thoracic cavities. Thus the size and shape of all the resonance chambers of the voice may be materially altered during their development.

Moreover, the characteristic resonance of a cavity being largely determined not only by the size and shape of the cavity but also by its contents, it follows that the lymphoid tissue in the nasopharynx, oropharynx, and larynx goes far in determining their characteristic resonance and thus in giving to the voice its distinctive features. The voice can only be normal when this lymphoid tissue is normal, and when the lymphoid tissue is increased in size, as it is by intumescences and hypertrophies, the sonance of the voice must be impaired, and the degree of the impairment will depend upon the degree of enlargement of the tissues forming the contents of the chambers.

Not only do enlargements of the lymphoid tissue affect the voice, however, but diseased conditions of this tissue, by rendering the contents of the resonance chambers septic and thus causing a thickening of the adjacent or surrounding membranes and muscles, are also reflected in the voice. A septic pharynx, for example, resulting from diseased faucial tonsils, is always a congested pharynx, and the pal-

atal and lingual muscles are always heavy and sluggish in their action during the act of phonation as well as that of articulation.

We must conclude, therefore, that the lymphoid tissue of the upper respiratory tract is beneficial to voice production when it is in its normal state, but in its abnormal state it is necessarily detrimental to phonation and articulation and absolutely obstructive to all efforts toward artistic vocalization, whether it be for speaking or singing.

The lymphoid tissue in the upper respiratory tract that becomes prejudicial to the voice is also prejudicial to the general health of the individual, and there is a dual reason, therefore, for trying to restore it to its normal condition.

OPERATIONS.

Indications for operative measures upon the lymphoid tissue of the upper respiratory tract should always be regarded as more or less of a misfortune so far as the voice is concerned, for the following reasons: First, a tonsil that requires operative measures is always either hypertrophied or degenerated, or both, and either or both of these conditions are deleterious to the voice; and, second, it is doubtful whether any kind of an operation upon the tonsils can ever quite restore them to their normal condition, and thus enable them to perform their normal functions in voice production. An improvement in vocalization, therefore, is all that can be promised to those requiring operative measures. The great vocalists have not had operations performed upon their tonsils, and they have not had tonsils that call for such procedures, else they would not be great vocalists.

The primary and chief reason for tonsillar surgery is and must always be to improve or conserve the general health of the individual, and the secondary, but scarcely less important, reason is to improve or conserve the individual's voice. These two reasons should be taken into consideration prior to every tonsil operation, and they should be given the degree of consideration that each of them demands. In the case of the singer or the prospective singer, the voice should be held in somewhat greater respect; but the truth is that every child should be regarded as a possible singer, and the conservation and development of its vocal organs should always be kept in mind.

Other things being equal, the less radical the operation the less liability will there be of injury to the voice, and hence the great desirability of conservatism in tonsillar surgery whenever radicalism is not absolutely indicated. As Dr. Thomas R. French, of Brooklyn, has well said: "Let us be radical when we must and conservative when we may."

The tonsil operation in children is one concerning which there is much difference of opinion, ranging all the way from that of those

who would rarely operate before puberty to that of those who operate freely whenever occasion presents itself. The fact is, however, that if conservatism is ever indicated in tonsillar surgery, it is indicated in the case of children, because the probabilities are that the active lymphoid tissue of children has important systemic functions, and because the voice is more easily injured during the growth and development of the vocal organs than after they have come to maturity. Moreover, with our present limited means of making differential diagnoses, it is very easy to mistake cause for effect in the pharyngeal diseases of childhood. A mere congestion of the pharynx, for example, or even an occasional attack of tonsillitis, is not a sufficient reason for removing the tonsil, for the cause of the disturbance may be, and often is, in some other and even remote region of the body.

TONSIL OPERATIONS.

GEORGE B. WOOD, M. D., Philadelphia.

(*Progressive Medicine, March, 1915.*)

Ernest Winkler says that, in making a choice of operative procedures on the tonsils, complete enucleation meets the requirement and gives better results even in children than does partial removal. He calls attention to the importance of removing embedded tonsils which lie high in the palate, because, by raising the floor of the vault, they interfere with nasal breathing, so that removal of the pharyngeal tonsil alone fails to free the nasopharynx. * * * As a result of his work, Winkler believes that enucleation of faucial tonsils in children is not any more harmful than in adults, and that, when operating on the structures, it is essential that all of the diseased tissues should be completley removed.

The operation of tonsillotomy, or the partial removal of tonsils, has been practically superseded by tonsillectomy, the complete enucleation. There are still, however, a few men who believe that tonsillectomy in children—that is, under 3 years of age—is to be avoided if possible, and when an operation on the faucial tonsil is required tonsillotomy ought to be done. Dickie says that while tonsillectomy by means of the guillotine is not a more serious operation than tonsillotomy in children under 3 years of age, tonsillotomy is preferable. On the other hand, tonsillectomy should be the operation of choice in all children over 5. His recommendation for the partial operation on children under 5 is on account of his belief that the tonsils have some function in early life, though as to its nature he is very much in the dark.

Harrison believes that tonsillectomy is always the preferable operation, because tonsillotomy may leave a condition which requires a

subsequent operation, and the portion of tonsil being left behind is liable to septic infection and, also, a partial removal of the tonsils may actually set up a series of attacks of tonsillitis. Further, in removing a possible tuberculous tonsil, there is the great danger of cutting through a tuberculous nodule which may result in a dissemination of the disease.

Tenzer, in examining a number of children whose tonsils had been removed at least two years previously, found nothing to indicate that tonsillectomy was followed by any deleterious influence. The result, as far as abolishing recurring attacks of acute tonsillitis, was ideal, and all of the children showed marked improvement in health.

THE NORMAL FUNCTION OF THE CHILD DENTURE IN ITS RELATION TO DEVELOPMENT OF THE JAWS AND OTHER FACIAL BONES AND THE PRESERVATION OF THE TEETH.

H. E. Kelsey, D. D. S., Baltimore, Md.

(*Dental Cosmos, February, 1915.*)

The subject of the care of children's teeth, in its most obvious aspect, has been receiving so much attention as to make further elaboration superfluous. That phase of the subject, however, which is indicated in the title of this paper seemed to me worthy of further consideration, relating as it does to nature's own methods for establishing and maintaining the health and usefulness of the organs, and through them contributing to the health of the individual.

VALUE OF HYGIENE MEASURES.

I do not in the least degree mean to minimize the value or importance of all the artificial hygienic measures which have been so ably set forth in the many papers that have been presented and through the oral hygiene movement which has been so justly attracting the attention of both the profession and the public generally, for they are absolutely necessary to the civilized individual in proportion to the degree to which he has been allowed or encouraged to depart from nature's physical processes in the preparation of the food for the stomach; or, to express this idea in another way, in proportion to the degree to which food has been premasticated before being taken into the mouth, thus eliminating the function of mastication and insalivation, which maintains not only in this way its health and cleanliness, but as well prepares the food in the only proper way for the further digestive processes, for by this natural retention of the food in the mouth, together with the natural act of mastication, is produced the first of that sequence of secretory stimulations which

provides in advance each division of the digestive tract with the proper ferments to take care of the particular kind of food which has been received at its beginning.

If we lived in an absolute state of nature, none of these artificial means would be necessary to the maintenance of perfect health. But we do not so live, nor is it necessary to do so to enjoy good health, for we can employ these artificial hygienic measures as adjuncts to nature's fundamental physical processes; yet we can not interfere too radically with those fundamental physical processes without interfering with development, and therefore health; and of all our physical organs we have interfered with the functions of none so much—especially in childhood—as with those of the dental organs, and of them all, none are of greater importance to the individual's health.

IMPORTANCE OF FUNCTIONAL ACTIVITY OF THE MASTICATORY APPARATUS.

It is strange, but true, that the acquisition of a certain amount of definite scientific knowledge relating to the nutrition of the body should have led us into a grave error regarding the manner in which that nutrition should be administered, apparently on the assumption that if we were smart enough to discover something of the manner in which the invisible stomach performed its work and what food was most suitable for it we could afford to ignore the mouth function in the preparation of that food for assimilation, substituting instead artificial comminution, especially in the child; for it was probably argued that as he is so weak in many other ways in comparison with an adult he must also be weak and inefficient in the use of his digestive apparatus, and especially that part of it which is under voluntary muscular control, the mouth. Then, too, the opinion has always seemed to prevail that the mouth was merely an orifice through which food might be introduced into the stomach, and that the teeth and mastication were only designed by nature to comminute the food sufficiently to permit of its being swallowed, ignoring insalivation, reflex secretory stimulation, etc. Acting on this hypothesis, it is not surprising that in this age of machinery it was decided that, no matter if adults were usually able to masticate their food sufficiently not only to extract some pleasure from its flavor, but also to make swallowing a safe and practicable operation, at least no chances should be taken with children; and we all know the parental fear of choking, which does not permit the baby to have the much-coveted bone to gnaw or solid food upon which to exercise and stimulate its jaws and teeth and the structures in which the teeth are implanted. What was the use, they argued, of risking the child's life by allowing it to attempt to reduce its food by mastication to a swallowing con-

sistence when we have at our command such ingenious machinery for pulverizing anything from wheat to meat or extracting its essence, which might be diluted with water? In fact, so great is the misconception regarding the use of the teeth that many people believe that they are thus preserving the teeth to longer life and greater beauty, not realizing that one year of vigorous chewing is worth more to a child than many toothbrushes.

Fortunately, we have in the last 10 years, through the careful study and research of a great many thoughtful men who have been studying the problem of nutrition from the mouth toward the stomach and intestines, instead of from the intestines and stomach toward the mouth, acquired a better understanding of this complex process, so that we now know the function of the mouth to be as important, if not more so, than that of any succeeding organ, inasmuch as it initiates that sequence of secretory stimulations which, as before mentioned, is so necessary to normal digestion and assimilation.

As a matter of fact, while a child at birth is a helpless little mass of humanity so far as locomotion is concerned, it has nevertheless certain well-developed muscles which are associated with the function of nutrition, and which enable it to extract its natural food from the breast with as much tireless energy as it will ever exhibit later in life in any other capacity. And during this period of its life it never suffers lack of development in the oral region if fed in the natural way.

By the time, then, that a child has reached an age when it exhibits an instinctive tendency to begin to take food other than milk and in a manner other than by sucking, it should have become manifest to its parents that nature's methods should be continued in its feeding, and that, as teeth have been provided, the child should be allowed and encouraged to use them.

Among most mammals—and there is no reason why the human race should be an exception—there is a period during which the young take both milk and solid food, their size gradually making the supply of milk no longer adequate for their needs, even did not nature, after a certain time, begin to diminish the supply of milk preparatory to casting the new creature upon its own resources. And it is during this period that its instinct to reduce solid food by long mastication and mixing with saliva to almost the consistence of the liquid milk to which it has been accustomed is strengthened into a habit, and thus the inclination to masticate properly is acquired and fixed so that it will not be lost later. It is the writer's conviction, supported by such investigation as he has so far made, that if the habit is not formed at this time it will never, or only in rare instances, be acquired later in life by a mere exercise of the will through the individual's knowledge that it is good for him.

ERRORS IN MODERN CHILD DIET.

The sedulous care which civilized parents exercise over the diet of their offspring is commendable in so far as it does not interfere with, or tend to alter, nature's methods; but usually it does this—often even in infancy, and more frequently from then to maturity. As mentioned previously, the fact that a child will occasionally choke, or, if left to its own devices, will choose food that will make it ill, is undoubtedly one of the reasons why parents get the notion that anything the child wants to do regarding its feeding must of necessity be wrong, and most of its instincts come to be regarded with suspicion.

A very scientific and in other respects excellent mother who had brought her child for the treatment of a malocclusion, when told that the child had not too many teeth, as she had supposed, but that its jaw had failed to develop sufficiently to accommodate them, said that this was very discouraging, since if she had been conscientious about one thing more than another it had been the nutrition of her child; then recounted an excellent diet, so far as materials went, which she had supervised for it since breast feeding—the only natural feeding, by the way, it had ever received. The list contained the usual fruit juices and but little fruit, beef juices but hardly any beef, and then only when it had been ground, and the same was true of other meats; milk and prepared cereals were important items, and some special child's food taken with milk was used for a time. A number of always fresh vegetables were also on the list, but nothing at any time to stimulate really effective chewing. I told her that she had undoubtedly furnished the child with sufficient nourishing food, but that in attempting to supplant nature in the preparation thereof she had defeated both her own and nature's ends. Through lack of function, the jaws and all associated structures had failed to develop, and nutrition had been below normal in spite of the excellent food, because the first important digestive process had been neglected. At the same time, this mother recognized the necessity for the general exercise of the body and limbs, and had insisted that the child should have plenty of it. How strange that she, like so many others, should not be able to carry her understanding a little further, and realize that one organ just as much as another must have functional exercise to insure development.

This case seems to me typical of a majority of those met with in the ordinary course of the dentist's and orthodontist's practice, while there are many others in which the child would be permitted to chew, but owing to some defect in one or more teeth can not do so with comfort, and is therefore worse off than the former, in that its food has neither natural nor artificial comminution.

Finally, there are some who supply a wholesome common-sense diet for their children, and not only permit but encourage them to chew their food well. This, if applied to the whole race, while it might not eliminate malocclusion and caries, because there are other definite factors concerned in the etiology of these disturbances, would nevertheless greatly diminish them.

CONCLUSION.

This is not a paper on Fletcherism, which has been so often and so ably expounded, and which means proper preparation of food by mastication for further digestion, whether it requires 10 minutes per mouthful for the dental cripple or only 20 to 30 seconds for the individual with a good masticating apparatus.

The mouth-hygiene movement, if broadened to include a popular knowledge of the foregoing facts, will do much within the next few years toward enlightening the public generally; but are we as a profession exerting ourselves sufficiently to instruct our patients with whom we come in daily contact along these lines?

INSTRUCTIONS FOR THE HOME CARE OF THE MOUTH.

ALFRED C. FONES, D. D. S., Bridgeport, Conn.

(*Items of Interest, May, 1915.*)

It is possible to remove all of the food débris from the teeth if the following details are carefully observed:

First. Brush the teeth with clear water upon rising in the morning and after each meal with a dentifrice.

Second. Follow the brushing after meals with the use of floss silk in all intertooth spaces.

Third. Complete each cleansing by rinsing the mouth thoroughly with lime water.

HOW TO BRUSH THE TEETH AND GUMS.

The mouth should be cleansed in four sections:

First. The outside surface of the teeth and gums of both the upper and lower jaws.

Second. The inside surfaces of the lower teeth and gums.

Third. The inside surfaces of the upper teeth, the gums, and the roof of the mouth.

Fourth. The chewing surfaces of the teeth.

DETAILED INSTRUCTIONS FOR EACH SECTION.

First. The outside surfaces of the teeth and gums.

Place the toothbrush inside the left cheek and upon the upper gums, well back in the mouth. Nearly close the teeth, moving the lower jaw forward if this is necessary to make the front teeth meet.

Make the brush go backward and downward to the lower gums, then slightly forward and upward until it has traveled a complete circle. This circular motion should be a light, rapid one, and continued forward until all the teeth on the left side and front have been brushed.

Do not brush the teeth or gums crosswise.

Brush the outside surfaces of the teeth and gums of the right side, using the same circular motion, reversing the direction of the circle if this is found more convenient. Brush long enough to thoroughly stimulate the gums and cleanse the teeth, going back and forth over all these surfaces several times.

Second. The inside surfaces of the lower teeth and gums.

With the same hold on the brush as for the right side, outside surfaces, brush the inside surfaces of the lower teeth and the gums with an in-and-out stroke, using chiefly the tuft end or tow of the brush. It will be noted that it is easy to reach the left side, but for the front and right side the wrist must be bent downward at a sharp angle, similar to the position of the bow hand of a violinist, and the elbow raised. Be sure to reach back in the mouth on the gums below the last tooth on both sides, and also to brush the gums back of the lower front teeth.

Third. The inside surfaces of the upper teeth, the gums, and roof of the mouth.

With the bristles of the brush pointing upward and the end of the thumb on the back of the handle, brush the roof of the mouth and the inside surfaces of the teeth of the upper jaw and the gums about them with a fast, light, in-and-out stroke, reaching back on the gums as far as you can go. Go back and forth across the roof of the mouth at least four times.

Fourth. The chewing surfaces of the teeth and the posterior ends of the arches, upper and lower.

Holding the brush as is most convenient, brush the grinding surfaces of, first, the upper and then the lower teeth, using the in-and-out motion.

Lastly, with a sweeping motion, cleanse the teeth at the ends of the upper and lower arches (the last molars) and the gums about them.

After brushing, the mouth should be examined with the aid of a hand mirror, pulling the lips away from the teeth, and if any food is found, brushing should be continued until it has been removed.

Either a powder or a paste may be used on the brush.

Brushing must be continued for at least two minutes. This means two minutes by the clock.

Do not use pressure with the brush.

Get a new toothbrush frequently. Notice that these are specially cut brushes and should be duplicated.

Candies, sugar, cake, pastries, crackers, and bread are especially apt to decay the teeth if allowed to remain on their surfaces.

HOW TO USE THE FLOSS SILK.

There is but one way that is effective in removing the food from between the teeth, and that is with a piece of floss silk or dental floss, as it is called.

Use a section of floss about 12 inches long. Hold one end between the thumb and first finger of the left hand and wrap the floss twice around the end of the first finger. Do the same with the thumb and first finger of the right hand. Now by using combinations of the ends of the thumbs and second fingers the floss may be carried into the mouth and forced carefully between all the teeth, care being exercised not to injure the gum in so doing. Rub it back and forth against the surfaces of each tooth to loosen and remove the food to clean these surfaces. After a little practice one can floss all the surfaces between the teeth in a very short time.

THE USE OF LIME WATER.

Lime water is very important and is advocated for two purposes: First, to wash away food débris, and second, to dissolve a gluelike deposit from off the teeth. This is called mucin and is the material that protects the germs that are active in food fermentation.

HOW TO MAKE LIME WATER.

Secure from a paint store 5 cents' worth of coarse, unslaked lime and crush it into a fine powder. The refined lime that the druggists sell does not seem to have the same solvent action.

Place a half cupful of the powdered lime in a quart bottle and fill nearly full with cold water. Thoroughly shake and then allow the undissolved lime to settle at the bottom of the bottle, which will require several hours.

After the lime has settled, pour down the sink as much of the clear water as you can without losing any of the lime. This water is poured off because it contains the washings of the lime and is not pure enough to be used.

Again fill the bottle with cold water, shake well, and allow the solution to clear itself. After the lime has again collected at the bottom of the bottle fill a 12-ounce bottle with the clear solution of lime water, being careful not to stir up the lime at the bottom. The 12-ounce bottle is used as it is easier to handle at the wash bowl. Refill the large bottle with cold water, shake well, and set it aside to use

when the smaller bottle has been emptied. This process may be repeated until all the original half cupful of lime has been completely dissolved.

HOW TO USE THE LIME WATER.

After brushing and flossing the teeth pour out a little of the lime water into a glass and, taking it in the mouth, force it back and forth between the teeth with the tongue and cheeks until it foams. When it begins to foam this shows that it has been in the mouth long enough to have a beneficial action on the teeth. Now rinse out the mouth with clear water.

If the lime water is a little strong at first, dilute it about half and half. It should be used full strength, however, just as soon as the gums have become hard and healthy under the rapid, light brushing.

With the use of the lime water the toilet of the mouth is complete. The actual time required for the care of the teeth amounts to 14 minutes daily. Faithfulness in mouth cleanliness will not only prevent dental diseases, but will prove to be a valuable insurance for health.

POPULAR EDUCATION IN MOUTH HYGIENE THROUGH ORGANIZED PUBLICITY.

M. JERMAIN JONES, M. A., *Director General National Mouth Hygiene Association, Washington, D. C.*

(*American Journal of Public Health, May, 1915.*)

I conceive the function of any well-ordered program of publicity to be, broadly, twofold: First, to awaken, in form, and enthuse members of the dental and medical profession and leaders in the great task of educating the youth of our country with reference to the strategic importance of mouth hygiene in the personal and public health problem of the Nation. Second, to enlist the rank and file of the people in the practice of simple rules of mouth hygiene in the light of its obvious advantages to the person and to the community. The first function contemplates organized expert leadership for proficiency in propaganda. The second contemplates popular education for promotion of practice among all people of the simple rules of mouth health.

In contemplating the forces that are to accomplish this great task of awakening 90 per cent of the people who are now more or less indifferent to the claims of mouth hygiene, nothing can surpass in value the enlightened personal professional service of the expert, of the dentist himself. As in politics the leader must lead, so in the problems of diet and dentistry the expert must advise. Before there can be publicity there must be information. Science is organized

knowledge, and science must master the laws of personal hygiene before attempting to give it as truth to the rank and file of the people.

* * * * * * *

The means of publicity which are touched in this paper are not all inclusive. They are selected as the best methods of bringing about the results desired economically and efficiently. The platform, the motion picture, the exhibit, the press are means of conveying truth to the minds of the people. The more perfect these instruments of publicity become, the more effectively will that truth be implanted in the minds of the people and the more promptly will they be likely to act. It is expected that in due season, as a result of such a movement as that represented in the mouth hygiene propaganda, the average intelligent person will consider the proper care of the teeth and the mouth fully as important as the provision of the right kind of food and drink, and that that same person will come to understand that it is quite as important properly to cleanse and treat the mouth as it is properly to clothe the body when appearing upon the street. It is presumed that the ultimate goal of such a propaganda would be to establish as a habit akin to the habit of the bath, the daily meal, the amenities of ordinary life—the habit of mouth cleanliness.

To bring this all about a vast campaign of education must be promoted by those who realize the importance of the problem. Our dentists and our doctors must become teachers. Interest in the idea of caring for the teeth and mouth must be awakened. Well-informed interest in the habits about the care of the teeth and their preservation will result in better habits of mouth health.

The task is a task of changing the attitude of indifference, carelessness, and willful neglect to one of positive conviction as to the need for safeguarding the health of the mouth. The average intelligent person is not at all interested in health. He becomes concerned only in cases of ill health. He gets interested in his teeth only after they have become diseased, decayed, troublesome. Toothache drives a man to the dentist. The great big job of the mouth-hygiene movement is to get people interested and active in preventing diseased teeth, and teaching them the fundamentals about the care and use of the mouth. As the port of entry to that marvelous mechanism known as the alimentary canal, the vital importance of the oral cavity, so far as it relates to essential nutrition and the nutritive processes are concerned, must be taught.

The four principal agencies utilized in this campaign during the past four years have been the platform, the motion picture, the exhibit, and the press.

The people of America are not tired of informing lectures. A man with a real message about how to live and who knows how to tell it can always get a hearing. One has only to consult the lecture bureau managers to ascertain the fact that the lectures on various aspects of bodily health at the hands of qualified men are sought for constantly.

The motion picture, as a device for popular education, has been perfected and exploited so thoroughly that it needs only to be mentioned. One of the first things undertaken by the Mouth Hygiene Association was the presentation of a scenario entitled "Toothache." Nearly 50 of these films have been sold throughout the United States and in Germany, Australia, Japan, and South America; and it is estimated that the number of people who have been reached through health weeks, under auspices of dental societies and in schools, has mounted into the millions.

The New York State Dental Society has recently produced a new film entitled "Oral Health," which supplements the work presented in "Toothache," and shows in a graphic and interesting fashion why it is necessary to have a healthy mouth in order to have a healthy body. There are a number of films available for use of mouth hygiene propagandists, which have to do with the nutritive processes, such as an X-ray picture of a stomach in actual process of digestion, tuberculosis films, and those relating to aspects of the food problem.

The exhibit has undergone a tremendous development in the past five years. Probably the International Tuberculosis Congress in Washington and the First International Congress on Hygiene and Demography gave the greatest impetus to the use of the exhibit as a means of popular education, and the attention of experts in the field of surveys and exhibits has pushed this device forward by leaps and bounds recently. The oral hygiene exhibit of the National Dental Association and the Ohio Dental Society became the basis of the National Mouth Hygiene Association's exhibit on oral health. This exhibit has been supplemented by a number of placards covering specific experiments in certain fields. It is felt that as it now stands, the exhibit is too technical to be widely useful in popular education, and plans are under way for revising this whole propaganda with a view to putting the simple facts more effectively before the people. There can be no doubt that the use of the exhibit as a means of popular education will grow, and that with it will develop a more effective use of this device.

The press is the great vehicle of socialized information. All education is a fitting for the service of humanity; but socialized education is a fitting of the greatest possible number for that service.

The slogan of the survival of the fittest has given way to the new ideal, that of fitting as many as possible to survive. The question of popular education in disease prevention is, How can we enlist the people in giving the mouth hygiene truth its proper place in their thought life and in their practice. It is a problem in applied economics, in applied science. In the solution of that problem, nothing can surpass an enlightened personal service, either professional, personal, or general; but, to multiply the effective work of one man or one woman by the widespread influence of organized publicity through the million-tongued press, so that thousands will know and act in response to its daily stimuli to-day where one did yesterday, is one goal of the mouth-hygiene movement. Social and civic workers, leaders in education, advocates of personal and public hygiene join the pioneers of the mouth hygiene in the dental and medical professions, to declare this new truth in disease prevention to the people by word of mouth; but the program of organized publicity will add to the effectiveness of this message the science and art of diffusing information by a wise and effective use of the press.

INTERNATIONAL STANDARD FOR TESTING VISION AND STANDARDIZING OTHER VISUAL TESTS.

EDWARD JACKSON, M. D., Denver.

(*Journal of the American Medical Association, August 29, 1914.*)

The cards of test letters in common use are admirably adapted to the subjective determination of errors of refraction, but as a test for visual acuity they probably afford the poorest and most inexact standard on which any scientific observations are now based. As a help in the subjective measuring of refraction they are superior to any substitute that has been proposed, and they are not likely to be given up. But as a scientific standard they possess two essential defects: (1) The different letters, when made as uniform as possible, are visible from very different distances. This makes them unsuitable for a scientific standard. (2) They can be readily committed to memory by all who are sufficiently familiar with them to make them a convenient test. This lessens their value as a practical test. For these reasons test letters should be standardized before they are used as a basis for records of visual acuity, and they should not be used when testing visual acuity is the only purpose to be served.

Before the American Medical Association at the Nashville meeting in May, 1890, I proposed the simple form of the incomplete square, subtending an angle of three minutes; in 1889 Landolt suggested the broken ring, and at Naples in 1909 the International Ophthalmological Congress adopted the broken ring as an international standard test for visual acuity, the most important official action that has ever been taken by an international ophthalmological gathering. Either

one of these tests furnishes an exact measure for visual acuity, so far as visual acuity is capable of exact measurement, and one enormously superior to any furnished by letters, numerals, or any series of conventional figures.

So long as the vision has improved by a change of glasses, and progressively smaller or more difficult letters can be read, the ordinary letter or numeral test card serves its purpose admirably; but when it is used simply to ascertain the maximum visual acuity, the chance of remembering the letter instead of seeing it is a serious drawback. This change is not confined to letters or numerals. It applies to all cards of test figures that can not have their directions or relations changed at will.

Here lies the great advantage of the incomplete square or the broken ring. As was pointed out 25 years ago by Landolt and a few months later independently by myself, if the card on which one or more of these tests are symmetrically placed is simply turned, it becomes impossible for the person tested to know, except by sight, in what direction the incomplete side is placed. By using a single broken ring or a symmetrical group of them printed on the center of a symmetrical card, the same card can be used for any number of repetitions of the test without giving any hint of the correct answer except by vision sufficient to recognize the figure.

This manner of using such a test makes it impossible to have a single card with a whole series of broken rings of different sizes printed on it. But one size can be placed on each card. The same amount of cardboard cut into the proper pieces can be made to furnish an equally complete series. When a large number of persons are to be tested, the best plan is to use a single test of a certain standard size. This is to be looked at first from or beyond the standard of distance. Then the person to be tested should gradually approach the card until the direction of the break is recognized.

For instance, in testing a class of school children the test should be shown to the whole class and its use explained. Then the children should be sent beyond the standard distance and each one made to approach until the break in the ring is recognized. If we take the standard distance of 5 meters, recommended by the International Ophthalmological Congress, and mark it off on the floor in 0.5-meter spaces, or double this distance and mark it in whole meters, we can at a glance ascertain the visual acuity in tenths. It is true that theoretically the variable distance introduces a minute inaccuracy through varying divergence of the rays from the test object; but this theoretical inaccuracy has no practical importance and is so extremely minute in comparison with the inaccuracies that we have every day tolerated in connection with the use of test letters that it may well be disregarded.

The rings may be arranged in squares as 1, 4, 9, 16, or any number may be arranged in circular form. I believe that as its advantages are appreciated the international standard test will come into universal use for the simple testing of visual acuity.

The international test, however, does not so directly help us in the problems of the consulting room in practically determining and recording the visual acuity obtained by use of test lenses, a very important part of our daily work. In this work, series of test letters arranged in graduated sizes will hold their own against any other method of testing visual acuity that has yet been suggested.

With our ordinary cards of test letters the practical accuracy of the international standard can be easily attained by the very simple expedient of numbering each line of letters by its equivalent value as compared with the international standard. For instance, instead of calling the 5-meter line a 5-meter line or a 16½-foot line, if it contains some of the more difficult letters, like B or S, number it 1, as expressing full vision according to the international standard. At the same time if half the letters on it can be read by an eye having vision of only $\frac{8}{10}$ by the international standard, also indicate this on the card; half the letters equal $\frac{8}{10}$, all the letters equal 1. If one or two letters can be recognized by a person having $\frac{8}{10}$ vision, that fact might also be indicated; but practically it will usually be best to give only the two values, one value for a certain portion of the letters, as ½, and the other the acuity indicated by reading every letter on the line. In a word, we must standardize our cards of test letters. When this has been done, it is just as easy to read the standard of visual acuity indicated from the card used as to read the old meters or feet printed with each line to indicate the distance at which it was supposed letters of that size should be visible.

With the test card standardized we can use any arrangement of letters we choose, and as many different arrangements as we choose. We can employ one card one day and another the next day or the next month or after 20 years and still know that the comparisons of visual acuity are accurate. Each nation may test vision by cards suited to its own convenience. Illiterate test cards of any sort may be employed, and if properly standardized the results will be perfectly comparable.

This matter, simple as it is, is one of great practical and scientific importance. It is entirely worthy of the careful attention of every association of scientific ophthalmologists. To standardize the cards already in use and to bring the matter properly to the attention of those who publish such cards, it is suggested that this section appoint a committee and that every member of this section should cooperate with that committee to secure the best possible standardization of all test cards in common use.

CAUSES AND COST OF BLINDNESS.[1]

A. B. NORTON, M. D., New York.

(*Journal of Ophthalmology, Otology, and Laryngology, November, 1914.*)

For years oculists have recognized that nearly 50 per cent of all cases of blindness are due to conditions which might have been avoided. It is, therefore, of the utmost importance, from the economic point of view as well as the humane, that every possible measure to prevent blindness should be instituted. For the purposes of this paper and for comparison, we take the figures of Magnus, who tabulated 2,528 cases of double-sided blindness from reliable German sources; those of Trousseau, of 625 carefully observed cases in France; and the 572 cases reported by Oppenheimer, of New York:

Reported causes of blindness.

	Congenital blindness.	Blindness due to idiopathic diseases of the eye.	Blindness due to traumatism.	Blindness due to general diseases.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Magnus	3.84	67.08	10.76	18.39
Trousseau	3.04	57.12	16.32	23.53
Oppenheimer	3.84	48.08	28.67	19.41

This table shows about the same proportion of congenital blindness in all three countries; that blindness from idiopathic diseases of the eye is less frequent in the United States; that blindness from traumatism is much greater in this country than in either Germany or France, while France has the highest percentage of blindness due to general diseases.

The United States census for 1890 shows that for each 1,000 blind there were 555 males and 445 females. The proportion among males in this country is above the average, and for females decidedly below the average in the principal countries of the world.

Congenital blindness, we find from the above table, furnishes about 4 per cent of all cases of blindness. In the United States at large the proportion appears to be more than double these figures, as the 1890 census shows 8.46 per cent of the blind returned as congenitally blind, but probably due to inaccuracy of the returns.

The heredity of certain eye diseases is very marked. For example, congenital cataract has been found in 57 per cent of children born of parents who had congenital cataract, and 50 per cent of children of parents with retinitis pigmentosa are born with the same defect.

Syphilis is, of course, the most frequent constitutional disease of parents which predisposes to eye diseases in their children.

[1] Title of article: Conservation of Vision.

Blindness from idiopathic diseases of the eye causes 48.08 per cent of Oppenheimer's cases and 67.08 per cent of Magnus's cases. Ophthalmia of the newborn forms a very large percentage of these cases. Blenorrhea of adults, trachoma, and atrophy of the optic nerve are the other most important causes under this heading.

Blindness due to traumatism caused 28.67 per cent of Oppenheimer's cases. In this country there are nearly three cases of blindness from injuries for every one occurring in Germany. The number of cases of blindness of one eye from injury are, of course, very much greater, and in these there is the ever-present danger of total blindness from sympathetic ophthalmia.

In an effort to estimate the approximate cost in dollars of blindness in this country, we commence with the assumption that there are 118,000 blind who, from their affliction, are rendered incapable of earning anything. This assumption is, of course, an error, as some undoubtedly earn a good deal, while many are able to earn a little, but at present we have no statistics at hand to show the earning capacity of the blind. Another source of error in the following figures is that the cost of maintenance is based upon the figures of the Bureau of Labor Statistics of working people living in families, but as many of the blind live in institutions the cost of their maintenance is probably some less.

In 1901 the Bureau of Labor Statistics ascertained the actual earnings of 25,440 families of working people in various industries; domestic and personal service; hand trades, which include bricklayers, carpenters, painters, etc.; the iron and steel industry; lumber and its manufacture; the textile industry; the manufacture of vehicles; trade and transportation. There was a small representation in agriculture, the fisheries, mining, and professional occupations. In the 25,440 families there were 24,402 in which there were husbands who were wage earners, and the average earnings of these husbands for one year, $621.12. In 2,173 families there were wives who were wage earners, and they averaged $128.52.

There were also 9,435 children who worked for wages, some of them also going to school a portion of the year, and the average earnings of these children were $191.99.

Assuming the 118,000 blind were equally divided among the three above classes of wage earners, the average earnings of each of the 118,000, if not blind, would be $313.88, or a total yearly earning capacity of $37,037,840. These figures are, of course, inaccurate, as in the 118,000 many are children under the working age, but this cause of decrease would be offset by the fact that there are more blind males, whose normal earning capacity is greater, than there are females. There would also be some increase over these figures because the Bureau of Labor Statistics has not in these statistics ascer-

tained the earnings of single women and widows, which would naturally be larger than wives who presumably were doing their own home work as well.

The average size of the 25,440 families was 4.88 persons, and the total membership was 124,108 persons.

The investigations of the bureau indicate that wage rates have increased in about the same degree as prices have; so it will be approximately correct to increase these earnings in the degree established by the price index numbers of Bradstreet's. This will give for 1913 the following figures: For husbands, $755.03; wives, $156.23; children, $233.38; an average of $381.55, and a total yearly earning for the 118,000 of $45,022,900.

To determine the total public loss from the economic viewpoint, we must add to the above figures the cost of maintenance.

Again, referring to the Bureau of Labor Statistics, we find the average cost to maintain 124,108 persons in 25,440 families, about one-half of these being children in 1901, was $143.29 yearly, a total of $16,908,220. These figures should also be increased for 1913, according to Bradstreet's index numbers, to $174.18 each, or a total for the year of $20,553,240.

This would give on this method of estimating, which is admittedly inaccurate, a grand total of $65,575,140 per year as the cost of blindness in this country.

HOW EYESTRAIN IS CAUSED BY IMPROPER LIGHTING.

WALTER B. LANCASTER, M. D., Boston.

(*New York Medical Journal, August 29, 1914.*)

Let us return to the question of eyestrain from working with improper illumination, and ask how it is that the symptoms of conjunctival hyperemia, sandiness, etc., and the symptoms of fatigue (blur and pain) are produced. Attempts have been made to explain them as direct effects of the radiations either of ultraviolet rays or infra-red rays, or visible rays of unsuitable color. These attempts were quite unconvincing to me, so I sought further light, and finally constructed the following explanation, partly from suggestions made by various men, partly from my own.

In order to understand how working with poor illumination causes symptoms such as enumerated above, let us consider how other well-known causes produce similar symptoms when we use our eyes under conditions that are unfavorable, such as on a moving car, in a flickering light, a dim light, a glare, with troublesome shadows, with a source of high intrinsic brilliancy shining into the eye, etc.

We say we strain to see. What is it that we strain? Do we strain anything? I think we do. It feels as if we do. We are more or less conscious of not getting satisfactory images on the retina of the objects looked at, conscious certainly of exerting greater effort to fix and focus and decipher what we are looking at. Now, a little reflection will show that, in the art of seeing, certain adjustments of the eyes have first of all to be made; then certain sensations are experienced; and, lastly, these sensations are interpreted by the higher centers. Which of these three is concerned in the strain? I believe it is the first—the adjusting mechanisms, as I like to call them. The eye is an optical instrument. It has to be adjusted (1) to fix the object; (2) to focus it; (3) there are adjustments to the amount of light.

Fixation is a complicated act. It ordinarily involves 2 eyes, 12 muscles at least. How exact does it have to be? You are familiar with the well-known standard of resolving power of the eye to 1′, i. e., two black lines on a white ground can be distinguished as two if the angular separation equals 1′. While this is the limit of resolving power of the average eye, this does not represent the limit of refinement of space perception. This may be measured with more nicety by stereoscopic tests, and has been placed as low as under 3″, certainly under 12″, or one-fifth to one twenty-fifth of the usual standard of resolving power. We test the fixation power in the laboratory by taking two black points on a white ground, well illuminated, and moving away from them until we can no longer discern whether we are fixing one or the other. We find that as long as we can distinguish that there are two (i. e., until the two melt into one, owing to lack of revolving power of the eye), we can tell which we are fixing. Thus, the limit of refinement in fixing is at least as small as 1′. This corresponds to a retinal image less than 5$^{\mu}$ in diameter. Now make all the allowance you wish for certain factors that should be considered, still it is abundantly proved that fixation is capable of extraordinary refinement. When we do our best, we can fix an eye to within a few thousandths of a millimeter.

How about the two eyes? Here is where binocular vision comes in. Any displacement of one eye with reference to the other by throwing the image on noncorresponding points can change the perspective. Under the most favorable conditions of testing, this is capable of a refinement down to a few seconds of angle, as stated above. Again, allow liberally for the various factors which must be considered, and still we have a limit for binocular fixation that is almost inconceivable—a retinal image of less than 1$^{\mu}$.

I have gone into this simply to give a more vivid idea of what it means to fix as carefully as you can. Bear in mind that the eyes are moving, so that the time allowed is almost infinitesimal, and the

difficulty grows. With focusing, a similar nicety of adjustment is possible.

In ordinary reading, however, we do not by any means make any such refined fixation and focusing. On the contrary, we glance along the lines, and so far from fixing each letter, we do not even fix each word. A suggestion is enough—our mental processes move still more rapidly and supply the gaps. This is assuming that conditions are favorable: Good print, good light, text easily understood. But let the conditions become unfavorable and it is quite another matter. Is the light unsatisfactory; are we on a moving car; is the print poor, the paper shiny and causing a glare? Immediately the eyes try to compensate for any of these or similar defects by securing a better image; greater nicety in focusing; more precision in fixing; better adjustment to light intensity. This greater effort takes in not only the coordinating centers, but also the muscles, etc., which execute the adjustments. These are put on a greater tension, additional muscles are put in action, increased flow of blood is provided; in short, we get conditions which are favorable to hyperemia and fatigue. Given these, and the symptoms enumerated above as characteristic of eyestrain are easily explained, hyperemia of conjunctiva and lids with sandy, scratchy, itchy, dry, hot feelings. When they become chronic we get blepharitis, conjunctivitis, and other diseases by processes too obvious to require elaboration, viz, hyperemia, fatigue, lowered resistance, invasion by bacteria. Moreover, these are not limited to the conjunctiva; the deeper tissues of the eyeball and orbit and doubtless the cerebral centers partake of the same processes.

I have said nothing of the mechanism for adjusting the eye to quantity of light (iris, pupil) in this attempt to explain eyestrain from improper illumination, but have put all the burden on the adjustments for fixation and focusing. This is contrary to the opinion of various men of authority and requires further elucidation. In the first place, it is apparent that my explanation accounts for the fact that the symptoms of eyestrain from improper illumination are the same as those of eyestrain due to the ordinary causes, viz, errors of refraction and muscular balance. In these latter conditions no one would hold that the iris plays an important part. It plays an indirect part of some importance in that, when the pupil is habitually large, errors of refraction are magnified, (1) because the circles of diffusion are larger and so the focusing has to be more accurate on the part of the ciliary muscle to get equal perfection of retinal image, and (2) because the larger area of the lens through which the light enters when the pupils are large introduces the important element of aberration—of differences of refraction between different parts of the lens. The center and the periphery are rarely the same and often differ more than a diopter. Gullstand found in a "normal" eye a

difference of 4D. between the center of the optical zone and a point 2 millimeters removed from the center. (Hess, in Grafe-Samisch's Handbuch der gesamten Augenheilkunde, VIII, p. 121.) Stadfelt found that in the zone lying between 2 and 3.5 millimeters from the center the aberrations average 2D. (Tscherning, Physiological Optics, p. 107.)

It is a fact frequently observed that patients with large pupils have more trouble with their refractive errors. But it is not a fact that activity of the iris in changing and adjusting the size of the pupils is a factor in eyestrain from errors of refraction. Neither, in my opinion, is it a factor in the eyestrain from improper illumination, except in the case of flicker. Continuous contraction of the sphincter of the iris can be kept up indefinitely without discomfort. An important fact that is usually lost sight of is that this muscle is smooth muscle, like other sphincters of the body, e. g., of the bladder, and it is characteristic of these that they normally maintain continuous tonic contraction without discomfort or fatigue. Experiments which I have been carrying on at the Harvard Ophthalmic Laboratory indicate that the same is true of the ciliary muscle. Continuous tonic contraction can be kept up for hours without fatigue. Why, then, it may be asked, does ciliary fatigue play a more important part than iris fatigue, if both muscles can maintain continuous tonic contraction without discomfort? It is not the continuous steady normal contraction that causes the fatigue and discomfort. Even in the case of the iris, if it is exposed to considerable changes in illumination at such a rate as severely to tax its power of adjustment, say, three or four times a second, there is reason to believe that it will cause discomfort in short order. This applies to flickering light, but is probably not the only factor in the discomfort which results from trying to work with a flickering light. In the case of the ciliary muscle, as I conceive of it, it is not the normal, continuous, steady contraction, a contraction that is necessary for adjusting the eye to near work (or in case of hyperopia, even to distant vision) which produces fatigue and discomfort, but rather it is either when the amount of adjustment is unduly near the limit or capacity of the eye, as in hyperopia of sufficient degree or in presbyopia, or else it is when the eye is making futile attempts to secure a better image by trying to change its adjustment. Thus either too strong a contraction or a shifting changing adjustment, a futile groping after a more satisfactory but not attainable adjustment, will produce fatigue. If a satisfactory adjustment was attained and did not require an excessive degree of contraction, it could be maintained without discomfort.

A factor in this may be the inability of the two eyes to focus independently. As far as we know, equal stimuli are always sent to both.

Now, seldom are the two eyes so similar that equal ciliary contraction produces the best results for each. When the retinal images are not satisfactory there may be attempts to improve by trying now one, now the other eye in the attempt to attain satisfactory results. The strain on the mechanism of fixation is, in my own case (individuals differ), an even more important factor than the focusing. As has been stated above, we do not, when using the eyes under ordinary favorable conditions, fix with the utmost nicety and precision. It is sufficient if the image is brought to lie on the fovea without having to be brought to the very best spot on the fovea and without that slight shifting of fixation so that the image falls now on one group, now on a slightly different group of cones, which is such an aid in the finest grade of perception. This added refinement produced by slight shifting of fixation is one reason why the acuity of perception is greater than it would be if figured on the mathematical basis of the size of the cones in the retina as formerly accepted by most writers, including Helmholtz and many others. Now, under unfavorable conditions the eye is stimulated to greater precision of fixation and to the slight changes in fixation and to any other devices by which perception can be improved. In making these adjustments of fixation, not only are the centers stimulated to greater nicety of adjustment, but the muscles are put on greater tension, the eyes are held more firmly, as it were, which is obviously fatiguing in a much higher degree. Some of these theories can be subjected to experiment, and we propose to test them. Meantime they are offered as more plausible than those proposed hitherto, and criticism is invited.

PREVENTION OF MYOPIA.

HOWARD F. HANSELL, M. D., Philadelphia.

(*American Journal of Diseases of Children, January, 1915.*)

Risley's well-known studies of refraction among the children of Philadelphia public schools in 1881 showed the presence of a high percentage of errors. Correction of these defects (and his results have been confirmed by others) proved the value of glasses not only in relieving symptoms and giving more acute vision, but also in preventing increase of refraction. In other words, he has demonstrated that myopia is often acquired by the near use of uncorrected hyperopic astigmatic eyes.

The continued use of astigmatic eyes at the near point demands constant accommodation and convergence effort, and thus the eyes are laterally compressed by the internal and external recti muscles and are maintained in the state of refraction adapted to 13 inches,

that is, a temporary myopia of 3D. The combined effect of these two causes, especially in individuals who have inherited a tendency to stretching of the sclera, is to change the hyperopic astigmatism into myopic astigmatism at the opposite axis, and then by continuation of the use of the eyes under unchanged conditions the eyes become myopic in all meridians.

Risley's later publications (1913) of examination of nearly seven thousand eyes show a steady decrease in the percentage of myopia. The moral to be drawn from this careful study of statistics, and the truths clearly shown by them, is the necessity for the examination of all children's eyes under cycloplegia, and the accurate correction by glasses of errors of refraction. The modern classrooms, the better distribution of light, the improved paper and print, and the stricter attention paid nowadays to the hygiene of the pupils and to the elimination from the schools of students with contagious conjunctivitis, contribute in no small degree to the betterment of both eyes and health.

During the present year the committee of conservation of vision of the Pennsylvania State Medical Society has substantially aided the cause by having printed and permanently placed in schoolbooks used in Philadelphia public schools many thousand circulars stating in easily understood language rules for the care of the eyes. The prevention of myopia—and incidentally of some functional diseases and possibly of organic eye disease—is of incalculable value to any community.

THE NECESSITY FOR EARLY TREATMENT OF SQUINT.

GEORGE E. DEELY, M. D., New York.

(*Long Island Medical Journal, January, 1915.*)

As medical science is accomplishing and demanding so much in a preventive way in all its branches, and as it is incumbent upon us pursuing special branches in medicine and surgery to bring to the attention of the practitioner of general medicine the necessity of preventive measures in our particular field, I desire to direct your attention to the necessity for the earliest possible treatment of squint. The practitioner of general medicine appreciates the importance of and relief given by a proper refraction. Many headaches, gastric, and other symptoms have yielded to a correct estimation of errors of vision, and now the physician is so keen upon the point, he insists that the patient complaining of headaches at all suspicious of eyestrain visit an ophthalmologist. This required many years of urgent demand upon the part of the ophthalmologist. The ophthalmologist has also been educated to the employment of finer detail in the art of

refraction; consequently his work gives greater satisfaction to the patient and physician.

A new-born infant gives no evidence of knowing how to direct its eyes or interpret what it sees, but the sense of touch is conjoined with that of sight in the unconscious education of the eye, and this education is acquired with exceeding rapidity. The coordination of impressions, the correction of illusions by conjoint application of different senses goes on through life, but the capacity to acquire and modify habit is incomparably greatest in infancy; and knowing how to see is probably one of the earliest of all acquisitions.

The stimulus set up simultaneously by rays of light focused at corresponding points in each retina is transmitted and interpreted as a single impression. This is due probably to the crossing of the optic nerve fibers, the association fibers connecting the different nerve centers, and experience. The normal interrelation of the centers of the eye muscles and muscular and visual centers produces coordinate movements of the eyeballs, and in every direction binocular vision is obtained. Since any habit that might be acquired in youth is apt to become a practice as the child grows, every effort should be made to overcome such important defects as visual ones before they have continued too long a time.

It is a fact that we see more (strabismic) squinting eyes than we should, eyes that are practically useless, which might have been developed to a higher state of usefulness, or at least to a greater helpfulness to the possessor thereof, if the oculist had impressed upon the physician the importance and necessity of proper advice to these sufferers at the onset of this disturbance. The advice that the child will outgrow cross-eye does not measure up to medical progress; such advice may be responsible for an amblyopic eye. One would not advise a patient with a dislocated member to go about his or her affairs with the statement that he would outgrow it; that would be criminal neglect.

Heterophoria, strabismus, or squint is generally ushered in by an occasional squinting or turning of one or maybe each eye alternately. Periodical squinting is an indication of some refractive error or a muscular unbalance, and it may be observed first during convalescence from some childhood or protracted illness, when the tone of the patient is below par; or it may appear when the eyes are given continuous or new work which strains them; for example, desk work when the child first enters school. What are the factors that bring about squints? I have limited them to two, errors of refraction and muscular asthenopia. The squint occurs either because the child has two eyes so different that one sees distinctly and the other not, or the two eyes have such a large error of refraction that so much

energy is consumed in accommodating and converging in order to see near objects that the muscles of accommodation and convergence become so tired that one muscle—the stronger—overpowers the other and the eye turns in the direction of the stronger muscle. This gives the eye an abnormal visual axis, and so the object seen by the two eyes is focused at a different point on each retina. In the one with normal axis it is focused at the fovea centralis, and in the other it is not focused at the fovea centralis, but to one side. This gives a double image, the one focused at the fovea centralis being more distinct than the other. The diplopia so annoys the patient that a place of rest is sought for the eye. The further the eye is turned from its normal axis the less distinct the image, because it is focused nearer the periphery. Finally, the eye assumes as great an excursion as possible, and after a time (a year or years) nature learns from experience that there is only one object and suppresses the second weaker image, i. e., that of the squinting eye, which is called an amblyopic eye or an eye atrophied from disuse. The eye may assume a position showing unbalance of any pair of muscles. This unbalance may be purely congenital in origin, but this is not commonly seen.

THE FREQUENCY OF SQUINT.

There are more convergently squinting eyes than any other variety. The next most frequent are the divergent squints. The reason that the internal strabismus or squint is so common is because the internal rectus is a stronger muscle than the external rectus and its attachment is further forward upon the globe, giving greater leverage, and as we Americans are generally farsighted as a race, we have therefore, more internal squints. Hypophoria and hyperphoria are infrequent. The process that the eye undergoes in becoming a squinting eye (and maybe an amblyopic) bespeaks great suffering on the part of the little patient—I say little because the majority are under 10 years of age—and it accounts often for the many upsets at school, such as attacks of dizziness, nervous spells, headaches, and doubling of objects, which should forewarn us and prompt us to ascertain what is producing such a train of symptoms.

Do you realize the handicap in a commercial and social way to a person with a cross-eye, especially a girl? She is an object of ridicule. In order, then, to obtain and maintain binocular vision, to relieve refractive errors or muscular unbalance before they have impaired vision, to prevent the loss of sight in the squinting eye, and to anticipate the disfiguring of the face, general practitioners should advise the treatment of all eyes with even a tendency to squint, for the earlier they are put under proper treatment the shorter will be the treatment and the better the result.

A SELF-RECORDING DEVICE FOR TESTING THE COLOR SENSE.

J. ELLIS JENNINGS, M. D., St. Louis.

(*Journal of the American Medical Association, September 19, 1914.*)

For many years the Holmgren colored worsteds have been used by the railways and marine service of the United States and most foreign countries to test the color sense of their employees. When properly used, according to directions, this test has proved to be practicable and reliable. The most serious objections to it are (1) the worsteds become soiled by constant handling, so that the more delicate shades can hardly be distinguished one from the other, and (2) the method of recording the skeins selected by the candidate is crude, laborious, and liable to lead to error.

In order to overcome these objections I have constructed a test in which the worsteds are not handled and the candidate makes a permanent record of his own color sense. It consists of a square box, divided into an upper and a lower half, each half having a lid—virtually two shallow boxes with bottoms joined together. The upper side of the box is marked "Test No. 1, Green," and contains a color board made up of all the different colors, shades, and tints likely to be mistaken by the color-blind for green. The lower side of the box is marked "Test No. 2, Rose," and contains a color board made up of all the different colors likely to be mistaken by the color-blind for rose. The color boards, like the box, are absolutely square, and each contains 64 patches of worsteds of various colors and shades, making a total of 128 colors used in the test.

In each patch of colored worsted is a circular opening in the color board, which is for the purpose of registering the particular patch of color chosen by the candidate. This he does by inserting a pointed pencil of wood or metal through the opening and punching a hole in the record sheet which had previously been placed beneath the color board. The position of the patches of color and the circular openings have been arranged in an absolutely symmetrical design, so that when the box is turned in any one of four positions the same appearance is presented, and it is impossible to say which is top or which is bottom. The openings of the color boards are so arranged that the records of both the green and rose tests are made on a single sheet.

METHOD OF MAKING THE TEST.

The cover marked No. 1 is removed, the color board lifted out, a record blank inserted, and the color board replaced. Care must be taken to see that the mark "top" in the box, "top" on the back of the color board, and the top of the record blank all correspond. The box is now turned around several times until all sense of direction is lost.

The green test skein fastened to the inside of the box cover is placed at a distance of 2 feet and the candidate is given the pointed pencil and requested to look along each row of colored patches and when he sees the test color or one of its lighter or darker shades, he is to place the point of the pencil in the opening and punch a hole in the paper beneath. Having completed test 1, the cover is replaced and the box turned over, exposing test 2, the rose. The record blank having been inserted and the rose skein displayed, the test proceeds as before.

ADVANTAGES.

1. The candidate makes a permanent record of his own color sense.
2. The soiling of the worsteds by constant handling is avoided.
3. The worsteds are divided into two groups: In the first group are placed all the colors mistaken for green by the color-blind; in the second group are placed all the colors mistaken for rose by the color-blind.
4. The comparison of colors by placing two or more together is avoided.
5. The large number of colors used—128—gives free scope in the detection of all cases of color blindness.
6. The small size of the color patches, while ample to show the color to the normal eyed, may lead to the detection of a central color scotoma.
7. The tedious method of recording the color sense by pulling out a concealed bangle and writing its number on a blank is avoided.
8. An important color can not be lost.
9. On account of its symmetry, it is absolutely impossible for any but those with a perfect color sense to pass the test.
10. It is the only method by which uniform results can be obtained, whether the examination is made by the physician or by the layman.
11. Two or more records of the examination can be made at the same time, and the official at headquarters is able to see exactly what colors have been selected to match the test skeins.

I am indebted to Dr. Charles H. Williams, of Boston, for suggesting the method of threading the worsted.

A PLEA FOR COOPERATION OF PHYSICIANS TO PREVENT DEAFNESS.

C. R. Dufour, M. D., Georgetown University Medical School and Hospital, Washington, D. C.

(*Virginia Medical Semimonthly, April 23, 1915.*)

The largest number of those having catarrhal deafness are adults between 30 and 50 years of age, though we find this disease among children. Catarrh of the middle ear is usually due to an extension of a similar inflammation of the nose, throat, or nasopharynx, by

way of the Eustachian tube. In children it is caused very often by enlarged faucial and pharyngeal tonsils. Climatic conditions and a proneness of the subject to such a disease are the most prolific causes of this condition; especially is this so in adults. It occurs at all seasons of the year, but in cold damp seasons it seems to flourish most. Impairment of the general health, prolonged mental strain or anxiety, or privation may cause this condition. The use of tobacco, especially smoking, is very liable to cause an inflammation of the mucous membranes of the throat and Eustachian tube, which will later on affect the ears and also cause this disease. There are two forms of this disease, the hypertrophic and the hyperplastic. In the former, the mucous membrane of the Eustachian tube and middle ear swell, the result of venous congestion, which is followed by tissue hypertrophy. There is thickening of the mucosa of the tympanic membrane and swelling of the fibrous layer, which is followed by hypertrophy, and sometimes, in advanced cases, by a deposit of lime salts. The air in the middle ear becomes absorbed because of the closure of the Eustachian tube, which fact prevents air from entering. The balance of atmospheric pressure being lost, the outside pressure forces the drum membrane inward until its further displacement is prevented by contact with the inner wall of the tympanum and is retained in this position by the action of the tensor tympani muscle, which by nonuse becomes shortened. The tympanic membrane becomes sclerosed, the intratympanic ligaments are more or less affected, and the ossicular chain becomes ankylosed by newly deposited connective tissue, becoming fibrous in character. The catarrhal exudate becomes plastic and cements the articulations of the ossicles. All of these conditions interfere with free vibrations of the membrana tympani. We see, therefore, that the conductive mechanism of the ear becomes unable to transmit vibrations to the receptive mechanism. This being the case, sounds are not heard; consequently they are not understood, or are heard but partially. The hearing is therefore impaired in proportion as the conducting mechanism is able to transmit the messages to the receptive mechanism.

The majority of cases of deafness begin as the hypertrophic form. The beginning of this condition is very insidious; it gives no warning of its presence until it has been present some time. The first intimation the subject has that his ear is affected is a slight stuffy feeling in it, as if there was something in the ear that should be removed. Often he consults his physician to have the wax removed, which he thinks is the cause of the stuffiness. This sensation is not usually permanent, but comes and goes. It is worse after a cold and in damp weather. After a while it is likely to be constantly present and may or may not be followed by noises in the ear,

slight at first, like bells ringing, escaping steam, buzzing, etc., not noticeable during the day, but only at night or when all around is quiet; after some time it becomes loud, is heard constantly, and becomes annoying. Sometimes the noise precedes the stuffy feeling in the ear. The hearing becomes gradually impaired, and one or both ears may be affected. It may begin in one ear and not extend to the other for a long time. Very often one ear is found to be much worse than its fellow. I think we can safely say that this condition is progressive and rarely if ever gets well of itself. It is in the very beginning we must begin treatment—in the hypertrophic stage—and it is the first symptoms and what they mean to the ear if not combated that we must instill into the minds of the public. The question arises as to how we are to educate the public in regard to this disease. In reply, I will say that it will be no easy task. The general physician, the family medical adviser, will be the one to begin this crusade.

If the same methods and efforts were employed for the conservation of hearing as are now being made for the conservation of vision, great results would be obtained in the eradication of this form of deafness. The ears of the school children should be examined during each school year, up to and including the high school. There the early symptoms could be explained to these students, for they are of sufficient age to understand their significance. In the colleges this examination of the ears and hearing should be continued, so that by the time of graduating these students, who are to be the parents of the coming generation, will understand the importance of these symptoms and the necessity for immediate treatment should they become manifest in their own or their children's ears. Lectures should be given to the parents or guardians throughout the school year, and an earnest endeavor should be made to urge upon them the necessity of attending to them. * * * I would ask the general physician that when such a case comes to him for advice, please do not treat it as if it amounted to nothing, that is, was only a transitory condition which would get better of itself. * * * By a continuous and systematic method of instruction by physician to patient, from patient to friend, and from teachers to scholars, a knowledge of this disease and its effect upon the organs of hearing will gradually become known by the general public.

INTERESTING FINDINGS IN THE EXAMINATIONS OF THE EARS OF INSTITUTIONAL CHILDREN.

SAMUEL K. FROST, M. D., Brooklyn-New York.

(*Long Island Medical Journal, March, 1915.*)

During the past eight years I have been making physical examinations of children for the department of health for the purpose of dis-

covering physical defects that might be corrected. For the last two years my work has been confined to the children in institutions. Among the institutions in which I examine children is one for the deaf, and being interested in diseases of the ear I was curious to know the physical and functional conditions of the ears of these children. Permission of the superintendent and sanction of the health department being obtained, I proceeded to make an examination of the ears. The number of cases that could be improved astonished me.

Condition of ears of children in two institutions for the deaf.

FIRST INSTITUTION.		SECOND INSTITUTION.	
Number of cases examined	89	Total number of cases examined	249
Impacted cerumen	25	Impacted cerumen	53
Chronic purulent	6	Chronic purulent	11
Eczema of canal	2	Eczema of canal	7
Foreign bodies (bead and wad of cotton)	2	Total defects	71
Total defects	35	Per cent	28
Per cent	40		

Condition of ears in two institutions with hearing children.

FIRST INSTITUTION.		SECOND INSTITUTION.	
Number of cases examined	275	The number of cases	256
Impacted cerumen	63	Impacted cerumen	95
Chronic purulent	5	Chronic purulent	11
Eczema of canal	5	Eczema of canal	4
Total defects	73	Foreign bodies	1
Per cent	27	Total defects	111
		Per cent	43

The number of defects found is larger among hearing children than among the deaf. It is quite probable that an equal number of ear defects might be found among average school children.

The question might be asked, What is the significance of these defects, and why should they be corrected? I may mention some of the reasons that occur to me, beginning with impacted cerumen, the most frequent defect.

First. It may give rise to neuralgia of ear, also of the supraorbital and temporal regions. It is irritating to the canal, causing scratching, thence infection; then furunculosis.

Second. Causes cough, usually referred to the larynx.

Third. Function of hearing always impaired. Therefore the child's mentality suffers; dull, stupid, inattentive. May also suffer from various reflex disturbances.

Fourth. Epileptiform seizures are reported from this cause.

Fifth. Dizziness and headache due to increasing labyrinthine pressure.

Sixth. In an ear with previous recurrent purulent inflammation the obstruction to the flow of pus may result in the most serious consequences, even death, by involving the intercranial structures.

Seventh. If cerumen be allowed to remain in the canal, the impairment of hearing which it causes will be progressive and may cause perforation or destruction of the drum, and also an ostitis of the bony canal and obliteration of the mastoid cells, thus seriously affecting the function of hearing.

CHRONIC PURULENT DISCHARGE FROM THE EARS.

This causes increasing impairment of the function of hearing, due to bone necrosis and destruction of the receptive and conducting structures.

It is dangerous to life, causing mastoiditis, meningitis, and is the most frequent cause of brain abscess.

An acute exacerbation of a chronic ear, resulting in mastoid involvement, is the most dangerous and most rapidly progressive of all forms of mastoiditis.

ECZEMA.

Eczema of the canal of the ear is very annoying to the child, causing constant itching; the canal of the ear gets filled with scales; scratching the ear infects the canal, causing furunculosis, a very painful condition.

Foreign bodies, of course, should be removed, being dangerous to both life and function.

FUNCTIONAL TEST OF HEARING.

It is very important in deaf children to determine whether they are absolutely deaf or still have a degree of hearing sufficient to be trained by the use of the aurophone. By means of this they may retain what voice they have and may be taught to converse in a nearly normal tone. If they are neglected, they soon lose all power of speech and make only unintelligible and horrible sounds.

It is my opinion, judging from the children that I have examined, that many cases that could be improved are not being treated to preserve their voices and improve their hearing because of careless or insufficient and sometimes no functional tests in the institutions where they are living.

GROWTH IN STATURE.[1]

ROBERT BENNETT BEAN, Tulane University.

(*American Journal of Anatomy, November, 1914.*)

During the school term of 1906–7 I examined and measured every available child in the public schools of Ann Arbor. This was made possible through the cooperation of Dr. McMurrich and the superintendent of schools and the teachers, who showed commendable zeal in furthering the work. The teeth of the children were examined by Dr. Bunting, who also assisted me in making the records. Two groups of children were segregated, one of American parentage solely, the other of German or American and German parentage. The titles American and German will be used for the two groups. When taken together, the German and American children will be called European. Children were grouped as German if two grandparents or if either parent came from Germany, and whenever the name was German and the parentage was not given the child was included in the German group, although there were only a few records of this kind. There is a large colony of Germans both in the town of Ann Arbor and in the adjacent country, and the majority of the Germans included in the records are of pure German extraction. A large number of children of the teaching staff at the University of Michigan are included in the American group and a large number of rural children are included in the German group. The whole lot of children may be called suburban.

The Manila school children were examined by myself in 1907–8 at the Normal and Trade School, where pupils from all parts of the Philippine Archipelago come to be educated as teachers and mechanics, carpenters, etc. The young children attend classes taught by the older ones at the Normal School and are necessarily from Manila and vicinity. The majority of the children are mestizos, mixed Spanish, Chinese, and Filipinos, and represent the littoral population of the archipelago fairly well. A few individuals are probably of pure Spanish extraction. No attempt was made to segregate the mestizos or those of Chinese or Spanish extraction from the presumably pure Filipinos, because any such attempt is necessarily imperfect and will be so until we understand better than we do at present the workings of Mendelian heredity in man.

The age of the children was obtained from each individual and verified as far as possible through the teachers. In Manila the school registers were also examined and the age verified in this way. Discrepancies occur in spite of all efforts to avoid them, but I believe

[1] See "Health of School Children," U. S. Bu. of Educ., Bul. No. 4, 1915, pp. 53, 54.

nearly all the ages are exact, and the few that may not be are approximately correct. The year and the month of birth were obtained in all except a few instances and the child reckoned to be a certain age if it is anywhere within six months of that age. For instance, if a child was born in January, 1902, and the records were made in July, 1908, the child was recorded as 6 years old, but if the records were made in July, 1907, the child was recorded as 5 years old, and if the records were made in August, 1908, the child was recorded as 7 years old. This method is practically the same as obtaining from the child the nearest birthday, although in giving that the child is apt to miscalculate.

The stature was obtained by using a stationary vertical graduated scale with sliding arm to come down on the child's head. This was pressed firmly and several readings were made for each record, the child standing erect with its back against the scale. The children were measured without shoes when feasible, otherwise allowance was made for the height of the shoe heel. The average or "mean" stature is used, although the "median" and the "mode" will be presented.

It is to be noted that all the boys and girls of each group have about the same stature at the age of 7 years, and the stature varies more both before and after this age. At 5 years the Igorot boys are 97 centimeters tall, the Filipino boys 105.8 centimeters, the German boys are 107.5 centimeters, the German girls 110.8 centimeters, and the American girls and boys each 112.5 centimeters. The difference between the smallest and tallest group at 5 years is 15.5 centimeters, whereas the difference at 7 years is only 4 centimeters. There are so few individuals at the age of 5 years in each group—the greatest number in any group is five individuals—that the differences given are of slight importance.

After the age of 7 years the differences become significant. The Igorots are still much below the average of any other group, and the Filipino boys are also low in stature, but between 12 and 15 years very nearly equal to the German boys. There is a constant decrease in the increment of growth in the Filipino girls, which decrease from the age of 7 onward is greater than that of any other group.

The growth of the Filipino girls almost ceases between 14 and 15 years, and there is apparently no growth after the age of 18 years. The stature of the Filipino boys is less than that of the Filipino girls until the age of 12 years is reached, at which time the boys pass the girls in a rapid growth that decreases suddenly at the age of 17, although there is a slight increment of growth in the Filipino boys even after the age of 20 is passed.

The stature of the German girls is less than that of the German boys before the age of 11, greater between the ages of 12 and 14,

after which it is again less, but very slightly so. There is a sudden check in the growth of the German girls at 14, but after 15 the growth again accelerates. The growth of the German boys is fairly uniform throughout, and there is no evidence of cessation at the age of 16. The growth of the German boys is, however, slightly more rapid after the age of 12 than before. There is also a slight acceleration of growth in the German boys up to the age of 8, and a slight retardation between the ages of 8 and 12.

The stature of the American boys and girls crosses and recrosses up to the age of 10 years, that of the girls in general is less before this age. Between the ages of 10 and 11 the stature of the girls becomes greater than that of the boys until the age of 14 is reached, when the growth of the girls ceases, to continue slowly after the age of 15, at which time the stature of the girls becomes less than that of the boys, and it remains so thereafter. The growth of the American girls from 15 to 17 years of age is retarded at a slightly slower rate than that of the Filipino boys, and there is a fairly uniform parallel growth of the two except for the sudden cessation in growth of the American girls from 14 to 15 years, the American girls at all ages being taller than the Filipino boys. The growth of the American and German boys is fairly parallel, the American boys slightly taller at each age except 8, when the German boys are taller. The American boys' growth is retarded from 5 to 7, accelerated from 7 to 10, again retarded from 10 to 13.

The stature of the American and German girls is fairly parallel until the age of 15, the German less than the American, but after the age of 15 the stature of the German girls exceeds that of the American girls.

In general the stature of the Filipino is less than that of the German and the stature of the German less than that of the American. The growth of the Filipino girls and boys and of the American girls has its final retardation earlier than that of the German girls and boys and American boys, the last three giving no evidence of this when the records cease at 18 years of age.

The stature of the Filipinos beyond the age of 20 is greater by 5.2 centimeters than that of the adult Filipinos of Taytay, a village near Manila. The boys belong to the well-to-do class. The Taytayans are poor, which may account for this difference. The Taytayans are also less mixed with the Spanish and Chinese than the schoolboys, which is another factor in accounting for the difference in stature.

The stature of the Filipino boys is 11 centimeters greater than that of the girls beyond the age of 20, and this is in excess of the usual sexual difference, which is often not more than 5 centimeters. This may be due to a greater inheritance of the father's stature by the boys

and of the mother's stature by the girls, because the fathers of many of the children are Spanish and Chinese and the mothers are Filipinos, and the stature of the Spanish and Chinese is greater than that of the Filipinos. This may be a confirmation of Pearson's findings that males inherit stature from the father and females from the mother. There are so few Filipinos below the age of 16 for each sex that the average has only an approximate value. There is also greater variability in stature at the ages of 12, 13, and 14 among the Filipinos than either before or after. For instance, at the age of 10 the extremes are only 15 centimeters apart and at the age of 15 only 25 centimeters apart, whereas at 12, 13, and 14 years they are 30, 35, and 35 centimeters apart, respectively. It is noted that the German and American children exhibit a variability that is greater with advancing years. The reverse is true of the Filipinos.

Growth occurs in waves. A period of acceleration is followed by a period of retardation. The periods occur at different times in the different sexes and races.

The first period of acceleration of which we have any record occurs between the ages of 6 and 10 years, after which there is a retardation, followed by another acceleration about the age of 13 to 15. These periods may be of interest in relation to the eruption and decay of the teeth.

Disregarding the first and second periods of rapid growth, of which we have no record here, it may be seen that the third period of growth begins at about the age of 7 years and continues until about the age of 10, being most rapid from 7 to 8, and at the age of 10 years the third period of growth ends.

The third and fourth periods of rapid growth are earlier for the girls than for the boys, and the fourth period of rapid growth is shorter for the girls than for the boys. The result is that the girls become larger than the boys between the ages of 7 and 15 and remain so until the fourth acceleration sets in for the boys, when they outstrip the girls in stature and remain taller thereafter.

The stature of the Filipinos is less than that of the Germans and Americans, and this becomes more evident after the age of 14 years.

The stature of the Igorot boys is less than that of the Filipino boys and girls, except at the ages of 7 to 8, when it is greater than that of the Filipino boys, and at the age of 20, when it is greater than that of the Filipino girls.

The Igorot boys attain their growth later than either the Filipino girls or the Filipino boys, but earlier than the German or American boys and girls.

The four groups may be arranged in order of precocity of acceleration periods as follows: (1) Filipino, (2) Igorot, (3) German, (4) American. The acceleration periods of the German begin earlier

than those of the American, but the ultimate stature is reached later in the German. This follows a law, general in nature, that the precocity or rapidity of development is inverse to the ultimate size.

The precocity of the group is inverse to the ultimate stature; the Americans the tallest, the Filipinos the smallest, with the Igorots and Germans intermediate; the Germans taller than the Igorots.

The Filipinos may have an early rapid development which is, from the European standpoint, premature, and a late maturity that is incomplete; at least it looks as if growth is continued up to a later age in the Filipinos than in the Europeans, but the extent of development is less.

THE BLOOD-PTOSIS TEST AND ITS USE IN EXPERIMENTAL WORK IN HYGIENE.

C. WARD CRAMPTON, Department of Education, New York City.

(Proceedings Society Experimental Biology and Medicine, New York, 1914–15, XII, No. 6.)

The success of health and vitality increasing measures is difficult to estimate on account of the lack of tests. It is possible to measure the result of long-continued activities, such as physical training, gymnastics, play, athletics, and good ventilation, on the one hand, and fatigue-producing activities, such as school life of various kinds, on the other hand, by noting the increase or decrease of incidence of disease, and absence from school, and the percentage of hemoglobin, etc. These tests are difficult to control, because they take a long time, and other factors can not always be successfully eliminated or controlled. It is highly desirable to obtain some test of some important body function which will show clearly and rapidly by its variations the beneficial or depressive effect of various conditions supposed to affect health. Such a test will be useful in proportion to the importance of the function tested and its accuracy in recording the variations of this function.

The following test promises to fulfill these conditions. It is well known that the splanchnic veins are very capacious, and if vasotone is relaxed, they fill at the expense of the rest of the body. The vaso control of the splanchnic area is in man comparatively recently adjusted to the erect position. As such, it is easily wearied and easily damaged by unhygienic influences which decrease the efficiency of the sympathetic nervous system. The efficiency of this control is, I believe, measured by placing the subject in a horizontal position and taking the systolic pressure in the brachial artery. The subject is then required to stand, and without removing the cuff, blood pressure is taken in a vertical position. In a perfectly strong and vigorous subject the splanchnic vasotone will increase and the blood

pressure will be found raised about 10 millimeters of mercury. In an individual weakened by dissipation, overwork, lack of sleep, or by the incidence of disease, the blood pressure will tend not to rise but to fall. Under conditions which may still be classed as normal, this fall of pressure may amount to 10 millimeters. These facts have been verified by repeated tests upon those known to be in good and in bad condition, in subjects well rested and others thoroughly wearied. It appeared, therefore, at this point in the investigation, that we have arrived at a test of an important function and that the test could be expressed numerically on a scale ranging from plus 10 to minus 10. A further factor of importance was, however, present. It was found in the vigorous subjects that the heart rate did not increase on standing and in the wearied subjects it increases as much as 44 beats per minute. It was further found that this difference varied with the blood-pressure differences and in some cases took the place of the blood-pressure variation. In other words, the same subject under the same conditions would show a weakness sometimes by a decrease in blood pressure and at other times by an increase in heart rate, and vice versa. After further observations it was determined that a decrease of one millimeter of mercury had a value of an increase in heart rate of approximately two. It was obviously necessary to consider both elements and to adjust the heart-rate changes with the corresponding blood-pressure changes. To do this it was assumed that the total observed ranges in heart rate and blood pressure were equal in total value and equal in each step in the scale in a proportion to approximately two to one.

The 100 per cent rating indicates a rise of 10 in pressure with practically no increase in the heart rate. Throughout the table, an inefficiency exhibited either in blood pressure or in heart rate is given a corresponding lower rating until zero is reached. The zero point indicates approximately the condition in which the vasotone system is working so poorly that the subject can not maintain an erect position. This test has been used by many observers to determine the condition of athletes and has been verified by putting the athlete through a test in running, etc., to check up the findings of the test. The results have, as a rule, verified the observed percentages. This test forms part of the routine examination in many colleges where athletes are examined by the physical director previous to certification of physical fitness. In five cases with five different observers, an athlete has presented himself for certification claiming to be in perfect condition and pointing to previous successful performances. In these cases the vasotone percentage was found very low and the candidate was referred to another examination on the next day. In these cases the candidates did not appear and were found to be ill.

Thus it appeared that test revealed a damaged vasotone, before subjective or objective symptoms were apparent. This test has been used to catalogue the effect of various school tasks upon the splanchnic vasotone. This test is being used by the New York State commission on ventilation to determine the effect of high and low temperature and humidities. In a preliminary report, it was found that vasotone efficiency was 50 per cent greater at 68° than at 86°. It is believed that this test will measure with reasonable accuracy the efficiency of the splanchnic vasotone and that this is an important indication of the efficiency of a body and related closely to vitality. It is realized that the test does not measure other important factors of physical and mental efficiency, and will not, for instance, reveal the structural condition of the heart. It does, however, open a new field for the measurement of the results of work calculated to improve physical condition.

BLOOD PRESSURE IN CHILDREN.

FLOYD M. CRANDALL, M. D., New York.

(*Progressive Medicine, March, 1915.*)

A series of observations upon the blood pressure of normal children was undertaken by Judson and Nicholson in order to determine whether a standard of blood pressure could be established. Could a standard be made it would open to the pediatrician a new aid in diagnosis and prognosis, and help in the treatment of a large number of diseases. Blood-pressure readings would also furnish a means of determining the physical tone of a large number of children who are below par, but have no demonstrable pathological lesion. The whole problem depends upon our having an accurate and reliable means of obtaining the readings. After the attainment of a correct technique a sufficient number of observations should be taken to establish a standard.

The blood pressure of children, as of adults, depends on four main factors: The contracting force and rate of the heart; the peripheral resistance of the arterioles and capillaries; the elasticity of the vessel walls; and the character of the blood as to volume, viscosity, etc. The contracting force and rate of the heart is the most important factor. Owing to the relatively larger, more elastic, and distensible arterioles and capillaries found in children, the peripheral resistance is less marked than in adults, and the vessel walls are in a less stable state of equilibrium. This simply means that the systolic blood pressure is a more direct representation of the work of the heart in the

adult. The importance of the vasomotor system must not be overlooked as one of the main factors causing variations in blood pressure in childhood. The volume and viscosity of the blood are, as a rule, of slight importance.

All blood-pressure determinations are influenced by certain physiological factors. Blood-pressure changes with alterations in weight, and in children of the same age varies according to height. The influence of the sex is less than in the adult, with slightly higher readings in the males. Emotions cause an increase in the pulse rate and a consequent elevation in the blood pressure. Within 15 or 20 minutes after meals there is a rise, and a fall again in three-quarters of an hour to an hour and a half. There is a gradual fall in blood pressure during sleep. At the end of the day blood pressure is higher than in the morning. There is a rise in blood pressure during exercise, directly in proportion to the muscular effort. During inspiration blood pressure falls, to rise again during expiration. In healthy children breathing does not exert much influence except during prolonged, forced, and deep respiration.

HEART DISEASE AND GROWTH.[1]

FLOYD M. CRANDALL, M. D., New York.

(*Archives of Pediatrics, September, 1914.*)

The final course of cardiac cases is always of great moment and interest. The patients in which the disease begins before 12 years have a very important period before them. The physician who ignores the gravity of a cardiac murmur and lightly says that the child will grow out of it is taking almost a criminal risk. It is quite true that during this period of change some children do materially change for the better. I have during the past year seen two such satisfactory cases—one a boy and one a girl. A murmur had been left following an acute endocarditis, and I had concluded that in neither case was it likely to disappear. Much to my satisfaction, however, the murmurs have disappeared and the hearts give evidence of being in normal condition. The myocardium, it is true, had in both cases not been apparently involved at any time and the compensation had been excellent.

Results like this, however, are not often to be expected and should never be relied upon. The unfortunate opposite in my experience has been more frequently the result. Several children at this trying period have done badly and succumbed even without repetition of the acute endocarditis. On the whole, I should say, when a murmur

[1] Title of article: Endocarditis in Children.

has been left and the myocardium has been in fairly good condition, children have gone through this critical period without material changes in the cardiac condition. If they go to 18 or 20 with a reasonably good cardiac muscle, they have a very good chance of going through the next three decades without cardiac symptoms. When the degenerative changes begin to appear, however, in later life, the individuals with impaired heart have not the chance possessed by normal subjects. They more readily succumb to acute disease and to arterial changes and are not as apt to live to advanced age.

In general terms my experience leads me to agree with Dunn, that the earlier the primary endocarditis occurs, the better is the ultimate prognosis, because of the more perfect adaptation of the child to the heart and the heart to the child. They grow up together and are more apt to adapt themselves to each other than they can do in later years.

The effect of endocarditis on the growth and development of a child has been a question of considerable interest to me. There are certain ones of the more grave cases, particularly those of decided rheumatic tendency with recurring attacks, which do not develop well. It has seemed to me, however, that the constitutional tendency of the child and its rheumatic involvement were often the factors more important than the heart lesions. I have seen child after child with distinctive blowing murmurs develop in a perfectly normal manner. I saw a little girl a few days ago who went through an acute endocarditis accompanying an inflamed ankle at 6 years, which left a loud, harsh murmur. She has done perfectly well, however, and began to menstruate at 12 years and 5 months. Now at 13 years and 4 months the murmur is but slight; she is developed beyond the average girl of 14 and is heavier and stronger than her twin brother, who is a perfectly sound boy. When the compensation is good there seems to be no reason why the child should not go on and develop in a normal manner.

PROGNOSIS AND TREATMENT OF ACQUIRED VALVULAR AND ACQUIRED PERICARDIAL MURMURS.

(Editorial in Pediatrics, May, 1915.)

According to Sutherland (The Heart in Early Life), a prognosis may be stated in precise terms, or it may be hinted at by the use of some noncommittal term. In connection with any suspected affection of the heart a loosely applied term may convey a very grave significance to the lay mind. If a child is stated to have "a weak heart," or "a murmur about the heart," or a "dilated heart," or "something wrong with the heart," that child is at once looked on by the parents as being the subject of heart disease. We may not be asked for any

other prognosis, or we may give a reassuring prognosis—it matters not, for the lay mind assesses at its own value the presence of heart disease. Hence it is advisable in connection with these cardiac disturbances not to use any term which could possibly suggest heart disease.

From the medical point of view the prognosis will depend on what view the physician takes of the significance of the disturbance. The whole of this section has been on disturbances which I regard as quite apart from heart disease in a medical sense. Consequently, the prognosis does not depend on the cardiac disturbance, but on any underlying disease or disorder of some other part of the body which is the primary cause of the disordered action.

The question of treatment is linked closely with that of prognosis. When these irregularities and murmurs and other forms of disturbances were insufficiently understood it was too often the custom to anticipate cardiac disease or debility in the future and to adopt more or less restrictive methods of treatment. The young person was restricted in all his habits and exercises, and often made a confirmed invalid because of suspected heart disease and of possible ills that might follow. If nothing did develop, this happy result was put down to the restrictive measures adopted. If the disturbance persisted, the restrictions were rigidly persevered with. With a clearer knowledge of the meaning and significance of these disturbances, such lines of treatment are now considered not only useless but harmful.

It may not be possible to pronounce at once as to the significance of the murmur. Regarding the youthful type of irregularity, one may state definitely and at once that it is of no importance and calls for no treatment. Regarding a cardiac murmur, one may find it advisable to watch the case for a time before definitely deciding as to the significance of the murmur. As already stated, a knowledge of cardiac murmurs and their significance is to be acquired only by experience. A definite decision must be come to as to whether the case is one of cardiac disturbance or of cardiac disease before any treatment is adopted.

When it has been decided that the case is one of cardiac disturbance, the important conclusion that follows is that no treatment directed to the heart is required. The patient may be required to be treated, and the following suggestions are made as to the line of procedure:

1. Consider the patient and his surroundings and his mode of life. Often it will be found that there will be some source of unrest in these conditions which has put the system out of tune and the removal of which leads to the disappearance of the cardiac disturbance.

2. Search for any source of irritation or any disease in other parts of the body. In many cases the cardiac disturbance is secondary to disease elsewhere, or possibly to gastro-intestinal disorder.

3. Examine very carefully into the state of the nervous system. I believe that the majority of the disturbances which have been considered are to be traced to a disordered state of the nerves, and will not be removed except by treatment directed to building up a healthy nervous system.

THE EFFECTS OF EXERCISE ON THE NORMAL AND PATHOLOGICAL HEART; BASED UPON THE STUDY OF ONE HUNDRED CASES.

CHARLES SPENCER WILLIAMSON, M. D., College of Medicine, University of Illinois.

(*American Journal of the Medical Sciences, April, 1915.*)

For a number of years the question of acute dilation of the heart has been a debated one. Many attempts have been made to settle the question, both by clinical observations and direct experiment, but these have led to no generally accepted conclusions. Until about a decade ago there was practically no difference of opinion on the subject. It was conceded that a normal heart, when subjected to even relatively slight strains, would dilate to a degree dependent upon the severity of the strain. If the heart were normal, this dilation was relatively soon recovered from—a sort of physiological dilation. In the event of the heart already being weakened from disease, this dilation might become permanent.

(After reviewing the methods and results of studies by others, the author describes his own method and then his results.)

The grouping of the patients was done entirely on the basis of the ordinary methods of examination. For normal subjects assistants and students were taken who had always been healthy and who were accustomed to engage in ordinary athletics, but no effort was made to pick men of unusual strength or athletic tendencies. In this group also were included patients with minor ailments who were otherwise in good physical condition and in whom the hearts were normal.

The second group consisted of patients with heart lesions in perfect compensation or patients in whom the ordinary examination disclosed no cardiac abnormality, but in whom it was fair to assume some degree of myocardial weakness as a result of severe anemia or cachexia. The moderately advanced tuberculous cases, nephritis, etc., were also included in this group.

The third group consisted of cardiac cases with frank but low to moderate grade compensation, presenting such symptoms as dyspnea on slight exertion, with enlarged and tender liver, edema of the ankles, etc.

The results obtained in the remaining 100 cases are given in the following summaries:

In Group I in 29 of the 33 cases exercise induced definite contraction of the heart, averaging 6 millimeters, and in one case—a young, strong athlete—this contraction reached 23 millimeters. In only one case was the heart unchanged in size and in only three did dilation occur, and then only 1 millimeter. It is sufficiently obvious that these last figures are within the limits of error of the method of measurement employed. We may conclude, therefore, that the normal heart responds to any exercise within its power by contraction.

In Group II it is evident that a considerable number of pathological cases with damaged hearts respond to exercise in the same manner as the normal heart; that is, by contraction. Of 57 cases, 24 contracted and 8 remained of the same size. On the other hand, about the same number—25—dilated.

The average contraction was 4 millimeters, the average dilation 3 millimeters. The maximum contraction was 14 millimeters and the maximum dilation 13 millimeters. The relatively insignificant average amount of dilation, 3 millimeters, is especially noteworthy. A perusal of the results shows that many hearts, with apparently normal findings, in patients with various diseases dilate after exercise, indicating their lessened tonicity.

A study of the results obtained from the patients in Group III, all of them with manifest broken compensation, indicates clearly that there is a distinct tendency to contraction, this occurring in six out of ten cases. The average degree of contraction, as would be expected, was small, 2 millimeters. On the other hand, in the four cases which dilated the average amount was only 3 millimeters.

Even to one thoroughly familiar with the reaction of the normal heart to exercise the results obtained in Group III are more or less of a surprise, since these show in the most striking way the extreme reluctance of the heart to dilate, even when there is already some degree of myocardial insufficiency present.

EXERCISE.

H. R. M. Landis, M. D., University of Pennsylvania.

(*Progressive Medicine, December, 1914.*)

There is constantly increasing belief that the various athletic sports can be carried to excess—that is, from the standpoint of injury. Butsch has suggested the formation of a sort of "scale" whereby one could determine the relative likelihood of damage or injury to be encountered in the various athletic pastimes. Thus, if the statistics of accidents in athletics, and the personal harm known to result all too often could be gathered in some way for purposes of public contrast, the physician and physical-culture teacher could advise more intelligently regarding the desirability of participation.

That there is need of greater care in the supervision of young men engaged in athletic contests, there can be no doubt. Within the past year a young man has been under my care who was allowed to compete in relay races, and who had had for some time an active apical tuberculosis. As the boy complained of feeling bad during this period, there does not seem to be much excuse for allowing him to continue without a thorough physical examination.

In regard to the possible evil effects of college athletics, there is another feature to be considered. Young men indulging in competitive college athletics devote a great deal of time to exercise. Upon graduating from college, they take up a business career, or enter one of the professional schools. The majority abruptly cease taking any exercise whatever, and, as a result of the lack of exercise and days spent in confined quarters, they rapidly lose condition. They are probably for this reason more susceptible to a physical breakdown than is the case with those whose manner of living differs but little from what they followed while in college. A muscle, such as the heart muscle, which has become slightly hypertrophied from exercise will eventually lose its tone, if it is not kept in condition by judicious exercise.

Another feature of exercise which more nearly concerns the general practitioner is that which should be prescribed for the business or professional man whose occupation entails a great deal of brain work and nervous fatigue. It is a very common practice among men of these classes to take relatively violent exercise late in the afternoon in the athletic or semiathletic clubs of our large cities. Usually this is done of their own accord with the belief that they are doing the right thing; very often, however, the playing of squash or racquets is prescribed for these men by physicians. The result is that in many cases physical fatigue is added to the nervous fatigue. Under these circumstances, the most rational procedure would be complete relaxation. The best form of exercise for men of this type is walking in the open air or playing golf several times a week. In both instances, they are kept in the fresh outside air taking a mild form of exercise as opposed to a somewhat violent form of exertion in a squash court, which is, at best, imperfectly ventilated.

THE MEDICAL ASPECTS OF ATHLETICS.

ROBERT E. COUGHLIN, M. D., Brooklyn, N. Y.

(*Medical Record, New York, August 8, 1914.*)

In this age of athleticism we are very apt to lose sight of the fact that athletics may be for evil as well as for good. No one will deny the good accomplished by the introduction of athletics into our

public and private schools, colleges, associations, clubs, societies, leagues, boy-scout organizations, Army and Navy, turning clubs, and other organizations where men and boys gather together for recreation, study, and pleasure. One has only to observe the steady growth and improvement in the physique of the growing boy who takes part in athletics. In Japan, Norway, Sweden, and Denmark, as well as in Germany, the physical training incident to the activities carried on in their turning and wrestling clubs undoubtedly improves the physical make-up of their male population. America is distinguished by the advance which goes steadily on in the physical training of the school children. This physical training is a salient feature of our American school education. Our ancestors, with fewer gymnasiums, were a remarkably sane people, however, and we may ask ourselves the question if the great increase in insanity has anything to do with our present system of physical training. Asylums and hospitals are crowded, and athleticism increases in proportion. One rarely sees the statement that the worthiest college student is the best athlete, as in the case of Albert Cyril Rothwell, of the class of 1914 of Columbia.

It would be interesting to know if physical training will accomplish a decrease in street accidents, an increase in moral tone, an improvement in physical condition, a decrease in gangs, a decrease in truancy, and better discipline in our boys. There is reason to believe that physical training means competitive games in which the vital organs are overtaxed. When this obtains, a great injury may be done to a boy's constitution. The injury may be a permanent one and markedly shorten his life.

It has been proved beyond question that immoderate college athletics lead to physiological hypertrophy of the heart. Athletic training leads at first to physiological hypertrophy, but when prolonged and marked by severer athletic contests it usually leads to hypertrophy, plus dilatation of a variable degree frequently marked by valvular insufficiency. Functionally the hypertrophied heart, even when dilated and giving distinct evidence of valvular insufficiency, may prove more fitted to carry the man through a severe athletic contest than a normal heart would be. On the other hand, acute cardiac dilatation occurs more frequently in athletes and men used to severe muscular strain than in the normal man and the effects are more prolonged and severe. L. Shumacker and W. S. Middleton conclude that there is reason to believe that, for normal human activities, an athletic heart is distinctly disadvantageous.

Unusual sensitiveness to muscular excesses during the period of boyhood must be considered in relation to immoderate athletics in the growing youth. Age is a factor of great significance. It is

doubtful if a person's constitution per se is made better or is improved by athletics. It must, however, be taken into consideration when one is to determine the fitness of a person to compete. Good nutrition, a competent nervous system, and adequate development must not be undervalued. Personal superiority and the stimulus of victory may make for the overdoing of deeds with their consequent ill effects.

Conclusions.—(1) Physical training is a very important factor in our American school system of education. (2) An athletic heart is distinctly disadvantageous for normal human activities. (3) An athletic heart may be better fitted to carry a person through an athletic contest than a normal heart would be. (4) Athletes appear to be as susceptible to infectious diseases as other persons in the ordinary walks of life. (5) Deaths of athletes are caused by the following diseases in the order of their frequency: Cardiac diseases, tuberculosis, typhoid fever, pneumonia, and Bright's disease. (6) Fatalities occur most frequently in the games of football, baseball, and boxing, in the order of the greatest number of deaths per year. (7) Athletics increase moral tone and discipline. (8) If possible, competitive features in athletics as practiced in our public schools should be eliminated. Feats of strength and endurance should also be eliminated. (9) All means should be used to diagnosticate diseased conditions in schoolboys, and special attention should be paid to the circulatory system, especially the heart. Tests should also be made for vasomotor tone; and, finally, the nervous system and the condition of the kidneys should not be undervalued.

HIGH-SCHOOL ATHLETICS.

(Editorial in the Journal of the American Medical Association, November 14, 1914.)

The Journal has freely expressed the view in the past that the competitive athletics of our American colleges and universities often harbor unsuspected dangers, in that they encourage overdoing on the part of the participants. No one would gainsay that systematic and even strenuous exercise may exert a most wholesome effect on the human organism. But the win-at-any-cost exertion, taxing vital organs to the very limit of their endurance, exceeding the factor of safety in physiologic functions, and sometimes carried to the breaking strain, represents a sort of unjustifiable self-sacrifice that may properly be made for one's country, but is never called for to uphold the glory of one's college. The sooner it is realized that there are better tests of manliness than the ability to endure a 4-mile race in the college boat or to complete the football season in spite of ac-

quired injuries, the more wholesome will American college life become.

Unfortunately there is a widely manifested tendency for the pupil of the high school to ape the performances of his older brother in the college. This is shown in the introduction of Greek letter societies and social functions into the secondary schools, tending to counterbalance some of their wholesome features of social intercourse, with the snobbery of exclusiveness and the deteriorating influence of late hours and tiring distractions. Even more baneful, however, is the growing custom of allowing the same sort of intense competitive sports in the high school that are the cause of complaint in respect to their dangers to the older college student.

We are glad to note a spirit of protest awakened in various parts of the United States against all the forces, social and athletic, which tend to deteriorate the American boy (or girl) at the adolescent age of the high-school period. One health officer has made a public announcement that proper exercise in a well-equipped gymnasium, under the guidance of a trained instructor, is good for anyone, but that competitive athletics, requiring most strenuous exertion, long and tedious training and self-denial, is positively bad for anyone before full development, and that all such overacts tend to impair the keenness of the mind and interfere with school work proper, as well as to injure the body. The competitive interscholastic games which require great physical exertion and mental tension should be done away with, and a good gymnasium, under the direction of one trained in physical culture, should be provided, and work according to the condition and need of each pupil assigned. We agree, further, that mild and well-timed athletic exercise and occasional social functions will tend to relieve the monotony of school life and invigorate body and mind, but overindulgence is likely to be detrimental.

The dangers referred to are not insignificant—they are real. Prof. C. R. Bardeen, of the University of Wisconsin, has pointed out, in connection with the participation in athletics in his institution, that the increasing amount of cardiovascular disease noted in this country by life-insurance companies and others makes it important for the physician to make himself acquainted with the chief causes responsible for these conditions, so that he can protect his patients. Overexertion in competitive sports, especially in schoolboys, is one factor. From 5 to 10 per cent of freshmen entering the State university have cardiac hypertrophy with dilatation attributable to athletic sports. While in most cases there is good compensation, in many there are mitral murmurs and a myocardial irritability which not only keep these students out of college sports, but to some extent hamper their scholastic work in college. Practically all college students taking

part in the major sports have hypertrophied hearts. While in many cases compensation is good, in a large number there is a myocardiac irritability, sometimes accompanied by mitral murmurs, which indicate somewhat serious lesions. In the past two years there have in addition been four cases of acute cardiac dilatation among the relatively few members of teams in the major sports to one case among the far greater number of students not members of teams. In the latter case the dilatation occurred while the student was running in the gymnasium.

Criticisms of this sort are never welcomed when they contravene established customs. Yet there is an obvious contradiction in directing the energies and funds of the State toward the prevention of disease and the establishment of habits of right living in the earliest years of our public schools, only to permit their undoing at a subsequent period. School doctors and school nurses in the primary departments have come to stay for some time, at least. Why not more healthful school customs in later years?

FAULTY HABITS OF POSTURE.

ELIZA M. MOSHER, M. D., Brooklyn.

(*International Journal of Surgery, May, 1914.*)

No one can question the fact that the human body under the most favorable conditions is heavily handicapped in its physical structure. In the upright position nearly every organ and tissue of man's body is obliged to perform its functions antagonized by the force of gravitation. The energy required to heat and move such a body far exceeds that demanded in the horizontal position of the quadruped. Man's organs crowd one upon another and against the walls which inclose them, while most of the blood that flows from the heart must climb back with difficulty.

Given a structure like the human body, with a thin-walled abdominal chamber containing organs the displacement of which disturbs the important processes of nutrition and causes the absorption of poisons generated within, what body postures habitually assumed will contribute most to the strength of the abdominal muscles and minimize the tendency to the displacement of abdominal organs? Manifestly, those postures which best maintain the normal curves of the spinal column—lumbar, dorsal, and cervical—in standing, walking, and sitting.

A moment's review of the human body shows that the pelvis is the pedestal upon which the spine rests—to which, indeed, it is so firmly fastened that the two move practically as one piece. The spine,

though slender, is a heavily loaded structure; its summit supports the head; from its upper third the chest is suspended with its organs and its large vessels always filled with blood; the arms drag upon it in this region through their scapular connections, and lower down the abdomen with its contents finds a close attachment to it.

It is axiomatic that "upon the position of the pelvis and head depends the shape of the body in standing, sitting, and walking." To maintain the spinal curves in normal relation to each other the pelvis must be elevated slightly at the back, dropped in front, and the head must be lifted to its highest point (chin in). The shoulders must not be thrown back, nor can they be dropped forward. Their normal place is in a vertical plane with the hips and parallel to them. In this position the arms drop easily at the sides of the body, with the elbows against the anterior superior spinous processes of the ilia.

Unfortunately for the spinal column and its load, the pelvis is dependent upon the legs and the feet for support in standing and walking. The position which these are trained to take, therefore, is of great importance. The pelvis is held in its best position when the following rule for standing is observed: "Place the feet in the position assumed in walking, the right foot a 'short' step in advance—toes pointed straight forward. Sway the entire body gently forward until the weight is 'felt' to rest upon the 'ball' of the supporting foot. Find an easy balance in this position, holding the head high and directly over the trunk."

The term "normal poise" has long been applied to this posture by physical educators. The American Posture League terms it "the vertical line position."

In this posture of the body the bones of the skeleton as a whole are placed most advantageously for the work of the muscles attached to them. It enables the spinal column easily to maintain its normal curves. It gives to the organs of the entire trunk the best positions in which to perform their functions. It is an interesting fact that enteroptosis is seldom found in individuals thus habitually poised, while on the other hand any considerable deviation from it, when permitted to become habitual, favors the production of enteroptosis. The explanation of this is simple—the normal curves of the spine are changed by variations to the position of the pelvis; for instance, drop it at the back and the lumbar curve immediately straightens; the dorsal curve deepens, flattening the chest, and because the head is needed for ballast to maintain body equilibrium, it moves forward, reversing the normal cervical curve.

This position of the spine permits the ribs and sternum to drop to a lower level, thus making difficult the movements of the intercostal muscles and those of the diaphragm. This posture also

shortens the anterior abdominal wall, interfering with the work of the recti muscles in particular and incidentally with those of the lateral abdominal wall. Relaxation of muscles due to approximation of their points of origin and insertion, here as elsewhere in the body, causes loss of tone and strength. The organs within the abdomen move in the direction of largest space, thus straining upon their mesenteric attachment to the spine, which in time lengthens and permits them to sag downward. Obliteration of the lumbar curve by lowering the pelvis at the back not only produces flat chest and relaxed abdomen, but round shoulders and "goose neck." The glutei muscles also dwindle in size from lack of use. All these unfavorable changes in the trunk may be attributed to the habit of permitting the body to rest most heavily on the heels in standing and the pelvis to rock backward in sitting.

Another common deviation from normal body poise is that in which the pelvis is tilted at the hip line, producing a long lateral curve of the spine. Unfortunately the right hip is usually the one elevated, and the right shoulder the one lowered, so that the pressure downward of ribs and diaphragm tends to displace the liver and transverse colon. Angulation of the latter at the hepatic flexure is likely to be produced, with its resulting stasis and dilatation of the ascending colon and cæcum. To a faulty position of the feet in standing and of the pelvis in sitting must be attributed the majority of cases of slight lateral curvature of the spine. To broaden the body base, the feet unconsciously separate and the weight of the trunk is transferred to one leg, usually the right. The left leg, with toes pointing diagonally forward, is shirking its work and hangs like a weight attached to the pelvis. Head and shoulders move to the opposite side (the right) to maintain a balance, with the result described. Sitting on one foot, or habitually leaning to one side in writing or drawing, tends to produce the same curve.

Under the conditions of life that exist at the present time, especially in cities, children and adults of both sexes are liable to acquire faulty habits of posture, for from baby-carriage days to middle life all are subjected to the molding influences of badly constructed seats and incorrectly fashioned garments and shoes, which unbalance the body. Multitudes of workers in all stations of life are being injured by occupational postures unnecessarily faulty, many of which tend to produce enteroptosis.

Parents and physical educators have long realized that boys and girls possessing tall slender bodies find normal poise most difficult to acquire and to maintain. They have not known, however, that a lack of proportion between the length and size of the waist and the breadth of the hips (long slender waist with broad hips) almost certainly predestines an individual to visceroptosis. Such a fate can

be avoided only by intelligent and patient physical oversight and training from early childhood through the years of adolescence. An enteroptosis belt should be applied when the first evidence of its need presents itself, and great physical strain should be avoided. Above and beyond all else the "verticle-line posture" should be made habitual from the earliest years of life onward.

We are only beginning to recognize the far-reaching effects of downward displacement of the abdominal viscera and the amazing frequency of its occurrence. Its prevention, early recognition, and correction should be the next great advance in medicine and surgery.

NEGLECTED LATERAL CURVATURE.

MAX STRUNSKY, M. D., New York.

(*Medical Record, New York, March 13, 1915.*)

We have progressed in every branch of medicine, but in the method of diagnosing incipient scoliosis we stand still. This in spite of the fact that we have had for some time the school system of examination by corps of physicians who are appointed for the distinct purpose of detecting diseases and deformities in children at the earliest possible stage. In spite of this, however, lateral curvature, which is so serious and which is the most widespread deformity that affects the human race, falls still to the lot of the mother, teacher, or dressmaker for an early diagnosis, just as was done hundreds of years ago.

Unlike tuberculosis of the spine (which causes systematic disturbances, such as pain, sweats, night cries, etc., which compel the parents to seek medical advice, thereby causing a discovery of the "knuckle"), lateral curvature usually produces no disturbances at all in the incipient stage. The future sufferers may even enjoy perfect health. Most important of all, the child does not know, and is generally wholly unconscious, that he is the victim of this deformity. It is not at all an uncommon experience to see a youngster who hears for the first time that his spine is not straight quickly feel with his fingers his scapula and his shoulders, blush with surprise, turn round to inspect himself in the mirror, hardly believing his senses that there is anything wrong with his back. And yet perhaps for years changes of the most serious nature have been progressing in the victim's vertebræ, intervertebral disks, ribs, spinal ligaments and muscles, gradually compressing the lungs, displacing the heart and the viscera. They were molding the patient's stature to the form which was surely to be his in the near future, namely, the twisted spine, the tilted trunk, the squat figure.

There is a regulation made by the boards of education that no child's spine is to be exposed. The school physician, therefore, in

examining for scoliosis, can only feel the child's back through the clothing. Such an examination at best can only reveal gross changes in the trunk, but can not detect early lesions. Even when the spine is exposed, unless one has a sound orthopedic judgment, cases will be passed over as normal when in reality serious deformity exists. This happens when the spinous processes are bent in the opposite direction to the rotation of the vertebræ. In such instances, if one judges from the direction of the spinous processes, the spine is pronounced straight, when in reality the rotation of the vertebræ, which is the serious element of the trouble, is advanced far. Such conditions are frequently illustrated by Roentgenograms and pathological specimens in the museums.

We must not forget that the muscles, ligaments, and adipose tissue have a tendency to hide the deformity, while the patient's compensatory attitude, which he unconsciously assumes, minimizes the prominence of the curves. This is the reason why scoliosis is so much worse in the skeleton, as revealed by the Roentgenograms, than appears when one merely examines the patient's back. We often stand aghast at the gross deformities of a spine and trunk as revealed by the X ray of patients who seemingly have but a slight curve.

What chance, therefore, has a child for an early diagnosis when the spine is examined through the clothes? Especially as it has been demonstrated of late that in so many instances the trouble begins in the sacrum and in the first lumbar vertebra, in which region the clothes are the thickest. No wonder, therefore, that in the thousands of cases which I have examined the fact which is most conspicuous in the history of practically all the cases is the accusing truth that the trouble was not detected in its incipiency, as should have been done in a civilized society, but rather the deformity was allowed to develop to the point of discovery. In other words, the deforming forces undermined the symmetry of the skeleton to that extent that, in spite of the covering of the soft tissues and the clothes of the patient, the trouble was discernible even to the eyes of the layman. How many thousands of children are there even now in every city who carry in their spinal columns rachitic vertebræ or malformed vertebræ which will be the cause of scoliosis in the future? How much harm is done these children in not exploring their spines as a routine. For without an examination of the back anatomical weaknesses as they begin to manifest themselves can not be suspected. As the result of this neglect harmful influences, which often precipitate the entire catastrophe, are even encouraged. For instance, these children are forced to sit up in school for hours at a time when their spines can but ill afford to support their superincumbent weight. Also by our indifference to the welfare of the

children's spines we necessarily rob the future scoliotics of the benefit of early treatment. This has yielded such excellent results that supporters of early treatment challenge any medical or surgical condition where an early treatment has proved more efficacious than in scoliosis. At the stage when scoliosis is "discovered," structural changes have already advanced so that children face years of tedious treatment by gymnastics or torturing jackets. And though the results are more encouraging now with the use of the Abbott method than with the jackets applied to the erect position, as advocated by Schulthess, Schanz, and Lovett, still the patient with structural changes, in the vast majority of cases, must carry his pathology and his invalidism to the grave. For there is no treatment which can bring back a segment of a vertebra once really atrophied, or make flexible that part of the spine which has become ankylosed, or bring back that part of an intervertebral disk which, due to pressure, has entirely disappeared.

PREVENTION OF DEFORMITIES.

Symposium by CORNELL, TAYLOR, WILSON, and others.

(*Boston Medical and Surgical Journal, January 28, 1915.*)

SCHOOL LIFE AND THE ONSET OF DEFORMITIES.

DR. WALTER S. CORNELL, *Director Division of Medical Inspection of Public Schools.* Deformities considered in connection with school life are almost entirely those of the spine, comprising principally stoop shoulders and lateral curvature. We need only to mention the intimate relation of a contracted chest to tuberculosis, general malnutrition, and the prevalence of lateral curvature to appreciate the major relative importance of these two physical defects to the entire remaining field of orthopedics. It is the consideration of physical defects in their association with others that forms the most basic principle of medicine in the study of growing children. Stoop shoulders and flat chest are in this paper considered as one condition. The causes of stoop shoulders are many. Workers in tuberculosis hospitals first noted the close association of pulmonary tuberculosis with the condition, and provided nose and throat dispensaries that fresh air might be obtained by these patients through their noses as well as through house windows. The casual relation of low nerve tone and malnutrition, of defective eyesight and hearing, and of low neuro-muscular tone has also been recognized. Most cases of lateral curvature are primary in causation and due to fatigue of the back muscles from overlong school periods. Our school curriculum should be amended to provide frequent periods of bodily freedom and relief. It will be remembered that "Ben Hur" asked

to row alternately on the starboard and port sides of the galley upon noticing the one-sided development of his fellow galley slaves.

The routine medical inspection of children will prevent a certain proportion of the stoop shoulders and scoliosis by the correction of myopia and astigmatism, removal of nasal obstruction, and treatment of catarrhal deafness. The great attack must be made from the standpoint of personal hygiene, the standpoint of direct corrective exercises. The system of corrective exercises just introduced into the Philadelphia schools is under the direction of the department of physical education, which cooperates with the department of school medical inspection. Special exercises are given these children in the schools and to be performed at home. I would make an earnest plea for the greater emphasis by orthopedists upon the common defects rather than upon new operations for serious and crippling deformities; a plea to the medical profession for the recognition of the symptom complexes in developing children; a plea for the medical care of patients upon the basis of hygienic living, with the courage to charge for advice which prevents disease; a plea for the better understanding of the intimate relationship of defects of the teeth to defects of the nose and throat; and, finally, a plea for the recognition by medical colleges of the necessity of instruction to students upon the diseases and defects of children of school age.

TUBERCULOSIS IN RELATION TO DEFORMITIES AND THEIR PREVENTION.

Dr. HENRY LING TAYLOR, New York City. Tuberculosis of the bones and joints is one of the commonest causes of crippling deformities which are a grave personal handicap and a serious economic loss to the community. In order to prevent the annual increase in the number of incapables from this source, we must first direct our preventive measures against the dissemination of tuberculosis: (1) By official inspection of herds and milk products, with the view of stamping out bovine tuberculosis and preventing the distribution of contaminated dairy products; (2) by segregation of the distribution of human tubercle bacilli and the disinfection of their sputa; (3) by the invigoration of children and youths and adults through a more hygienic life.

When a tuberculous joint is present we must make an early and accurate diagnosis and institute effectual treatment as early as possible, continuing it until the disease is quiescent. During this time the joint must be fixed in its most useful position, so that when the disease is arrested the limb may still be serviceable, even if joint motion is diminished or absent. Severe terminal deformities of the limb may be corrected nearly always by safe and comparatively simple surgical operations, and should be so corrected much oftener

than they are. Without having exact figures, I do not think joint tuberculosis is quite as common in New York, and probably in other large towns in this region, as formerly. We do not see so many severely deformed people on the streets. Whatever difference of opinion there may be about the bovine infection of tuberculosis, there is no difference in opinion of the practical results of having children in close companionship with advanced consumptives. Time and time again I have found cases in the clinic in which the child was sleeping in an unventilated room with the father in an advanced stage of tuberculosis and three and four cases of tuberculosis infection in the same family. These were not inherited cases, for we have seen the same thing in those of the same household but not related. In one case we found that the nurse of a baby was tuberculous. Failure in early and accurate diagnosis of deformity in bone and joint tuberculosis is as common as it is disastrous. Probably one-half of the fixed deformities are due to mistaken diagnosis or no diagnosis at all. The early diagnosis is not always easy, even for specialists.

The term "rheumatism" is one which is rapidly passing out of use in scientific language. "Rheumatism" means infection, and the source should be ascertained. There should be willingness to examine thoroughly cases which seem to be trivial. The patient should be built up by general hygiene, as in pulmonary tuberculosis; and probably a systematic application of sunlight to the naked skin, according to an exact and simple technic, is the most important advance in the last 10 years in the treatment of surgical tuberculosis. In our fresh-air home on Long Island we have just finished our eighth year, and the average gain in children kept out in the open air has been 7 pounds per summer per child for seven years. In the last year we have used direct sunlight treatment, putting the children in the sunlight for six hours a day without a stitch on them, and the results have justified the belief that this treatment is probably the most important advance in the treatment of joint tuberculosis in the last 10 years. In the local treatment of tuberculous joints, with fixation properly applied, you will have little need of traction. The limitation of activity is extremely important. If the simple principle is observed of fixing the joint in the most useful posture, more than half of the bad deformities will be prevented. We operate freely in adults and sparingly in children.

THE STATUS OF THE GENERAL PRACTITIONER IN THE PREVENTION AND CORRECTION OF DEFORMITIES.

Dr. H. Augustus Wilson. In the great majority of conditions ultimately becoming orthopedic problems the onset and early progress are so inconspicuous that in the beginning they defy accurate

diagnosis. It would seem that the general practitioner has the largest opportunity to determine the relative importance of the various etiological factors in scoliosis in school children. In the early history of bone tuberculosis there is a period of uncertainty when the symptoms are attributed to other causes. The referred pains are usually classed as "rheumatism," a word which should be stricken from our vocabulary. The etiological importance of the eruptive fevers in the producing of joint affections; of typhoid fever in post-typhoid dislocations; of often remote gonorrhea in subsequent arthritis; of various factors in numerous forms of backache; and of pyorrhea in a vast variety of nontuberculous joint affections, as well as the expedience of employing passive motion in treatment, is a problem worthy of close attention. The general practitioner has a most difficult task when he encounters congenital deformities. Whether he knows it or not, he is confronted with Wolf's law that all prolonged alteration of the function of any part of the body, either congenital or acquired, is surely followed by anatomical changes. He must analyze carefully the many conflicting statements regarding the advisability of immediate correction or of postponement. After all the various problem-students have made their reports, it is often the province of the family physician to decide for the family upon the actual diagnosis and to direct the treatment. The various laboratory aids to diagnosis, when combined with an analysis of clinical findings, often materially assist in diagnosis. With the essential clinical phenomena as a basis, doubt can often be changed to certainty by the employment of radiography, blood tests, urinary analyses, and bacteriological research, but I know of nothing more confusing than a radiogram, unless it be the report of a radiographer who attempts to make a diagnosis without accurate clinical data. I believe there is entirely too much hastily conceived and misapplied treatment. The essential ingredient of any therapeutic measure should be skillful diagnosis. This is accomplished only by devoting time and discernment to a skillful weighing of all obtainable facts.

DISCUSSION.

DR. R. TAIT MCKENZIE. To the various factors bearing upon deformities I would add the design of clothing and the construction of furniture. I shall confine my remarks, however, to the subject of postural deformities that are nontubercular. As soon as we assume the upright position the pressure of the whole body weight coming upon the feet gives a tendency to their eversion, thus threatening deformity of the arch. The next point at which the bony structure may yield is at the knee, and from the slightly bowed leg there may be the condition of knock-knee. With an exaggeration of

the curve which may occur at the lower part of the back there is a compensating curve in the upper part of the back. The ribs are carried downward, the chest is flattened, and the abdomen protrudes, giving the typical condition of bad posture, with the consequent disarrangement of the contents of the upper zone of the abdomen and the long train of symptoms familiar to all. Many faulty positions are acquired in the schoolroom, where the child has to sit still for long periods of time. City conditions are also at fault, for the child has not the opportunity for play which gives the best development. This, however, is being corrected by the establishment of playgrounds. Occupation is another factor in etiology. In many occupations we are unable properly to use our muscular system. It is not surprising that we find motormen and hospital nurses flat-footed. The underlying principle in all these deformities is fatigue in some form. Much can be done in the schoolroom by breaking up the long periods of study by short periods of rest and exercise, and by tests in posture. It has been found that one of the chief causes of the stooping of children has been in the structure of clothing by which a constant pressure is felt on the back of the neck. This is remedied by changing the cut of the garment.

DR. JAMES K. YOUNG. Three sources of infection in tubercular children are (1) cow's milk; (2) nurses and attendants; (3) infected rooms. The faucial tonsils seem to be the chief channels of infection. My clinical observation leads me to believe that suppuration does not so frequently occur in these instances of bovine infection as in the human. The importance of the source of infection being that of nurses and attendants has so impressed Mr. Thomas A. Edison that he has personally supervised a photoplay entitled the "Temple of Moloch," which has for its climax the discovery of the infection of two children by a tubercular nursemaid. The photoplay is to be used by the Tuberculosis Commission in its warfare against the white plague.

The occupations which seem to be most suitable are not always the best adapted to or selected by the deformed person. Music, especially orchestral, wireless telegraphy, and the telephone have afforded valuable means of livelihood. School teaching is a suitable occupation for those in whom the tubercular process has been arrested.

DR. CORNELL (closing). I have learned much to-night and shall urge upon our school authorities the importance of vocational training of crippled children and of the provision of ample sunlight in our school buildings. The psychology of crippling deformity is an aspect of the problem totally different from that of the mechanical treatment, and claims our best endeavor. I would especially plead for treatment by the medical profession of crippling deformities from the preventive standpoint.

DR. TAYLOR (closing). I would not be misunderstood regarding the value of the X-ray. What I said was that in the early cases the X-ray frequently showed nothing. I do not wish to be understood as believing that you can not get good results by traction, but, as I have said, if you will handle your case with fixation properly applied you will have little need of traction, and a little motion is worse than a stiff joint.

EFFECT OF IMPROPER SHOES.[1]

DEXTER D. ASHLEY, M. D., New York.

(*New York Medical Journal, May 29, 1915.*)

The learned biologist classifies man as a plantigrade—a sole walker. Fashion and the shoemaker have made him (especially the female) a digitigrade—a toe walker. This is a transmutation, avoiding transition—an evolution by leaps and bounds, considered possible by Huxley, though he gave no examples.

Most transitions in nature are accomplished at a sacrifice in efficiency and for a time a proneness to deformity and disease of the part in question. We have an animal that should carry an upright body in standing and walking, as a plantigrade with a broad sole with three points of pressure, a tripod—the heel, outer side of the foot, and ball of the foot—when all too suddenly this tripod is superseded by placing the weight upon the anterior leg of the tripod—the anterior foot—and the assumption of the progression of the digitigrade. Can you wonder that nature takes her toll in discomfort, subjecting the individual to a list of infirmities never experienced by primitive man? The mere mention of some of these infirmities should deter the transgressor and warn him to lead the simple life if he would avoid pain, deformity, and impaired locomotion.

Digitigrade progression persisted in means weight bearing on the distal extremities of the metatarsal bones, with the phalanges projected upward at a sharp angle instead of extending forward. By continued stretching of the capsular ligaments the sensitive synovial ends of the bones are uncovered and exposed to pressure. In many cases the joint becomes permanently, partially, or totally luxated or dislocated, resulting in hammer toes or flexed toes of mild or severe degree, with corns on the toes and callosities in the anterior metatarsal arch (metatarsalgia, Morton's disease, or Morton's neuralgia), due to the crushing and thinning of the tissues and the giving way of the anterior arch, resulting in a broadening and thickening of the anterior part of the foot, with mild or severe hallux valgus, bunions, overriding toes, clubbed toes, hallux rigidus or still great toe. The

[1] Title of article: The New Species in the Human Family.

X ray shows a thinned bone cortex, increased cancellous tissue, a dumb-bell atrophy of the proximal phalanx, distorted joint surfaces, and bent bones. The great mass of muscles on the plantar surface—five layers of plantar flexors built into the arch—are almost functionless. Withered by disuse, crushed by braces and high, unyielding arches built in the shoes, we have seemingly lost track of these muscles in our mad scramble to brace, prop, and support the foot while walking on our toes. There is always a loss of the muscular control which is necessary to an elastic progression, ability to maintain an upright position and a good carriage, and strength to succeed in this strenuous life.

The entire anatomy of the part is affected. Weak ankles, loss of balance, fallen longitudinal arch, weak foot, strained foot, sprained foot, sensitive, painful foot, flat foot, rigid foot, elongated foot, pronated foot, abducted foot, and valgus foot are some of the terms designating the ills we bear and the price we pay for unphysiological walking and standing. These conditions are accompanied by swollen, puffy ankles, with referred pains in calf, knee, thigh, and back. Frequently there are severe intermittent cramps, preceded by numbness of the toes and a burning sensation referred to the anterior foot. There may be severe pain, so persistent as to break the spirit and constitution, make life a burden, and render the sufferer nervous and irritable to a degree.

The digitigrade progression is conducive to sprained ankles and broken bones. The tendo Achillis becomes permanently shortened, preventing the normal range of ankle motion and necessitating a pronated position of the foot, valgus great toe, and bunion, due to the unphysiological body thrust imparted to the foot. When standing in low heels or bare feet, these people often complain of a sensation of falling backward.

While bearing the discomfort of these diseases, what wonder that this digitigrade of the genus homo is sometimes cross or has nervous prostration. This individual is suffering with weakened, inefficient feet, deformed from long wearing of viciously planned shoes. If this toe walker stands little and walks less and is given a very high heel and pointed toe, wedging the toes forward and the arch ends nearer together, the strain upon the arch muscles and ligaments is relieved and the pain alleviated at the expense of the anterior foot. The result can only mean more deformity, more weakness, dependence upon the energy and endeavor of others. If a turn of the wheel of fortune should at any time call upon such a dependent to be a helper, a worker, to sustain herself or others, she would be found to be a miserable cripple because of her abused feet.

That walking with an elastic step is the most invigorating exercise that can be indulged in by old and young is almost an adage—a recreation that is impossible of indulgence after wearing improper shoes, as practiced by a large proportion of our civilized population. The old European custom of making long tramps afield, along paths through woods and over hills, with friends and family, is hardly known in this country, the dusty or muddy roads offering to the pedestrian the only and uninviting avenue to the country. When we are there we find no paths leading to the woods. We are a riding nation. Walking for exercise can not find favor with our stilted digitigrade or be performed with the joy of living by one whose toes have lost all power.

CHAIRS FOR CHILDREN.

(Editorial in New York Medical Journal, March 27, 1915.)

There has been much agitation over the misfitness of school seats and desks, and there has doubtless been more or less correction of these sources of bad posture and of permanent deformity. Little or nothing is said, however, concerning the seat used in the home; the human sprout is often so tender that anything which causes it to be inclined from the normal must be taken into account. The average child, who cares little or nothing for books, is influenced little by either school or home seats, but the child who likes to read and who is disinclined (always with good reason, be it said) to active muscular exercise is the victim of ill-shaped seats in both the school and the home. Of what use is it for the general practitioner or orthopedist to prescribe corrective exercises for stooping posture and round shoulders if for many hours every day the patient is to occupy a framework which distorts the skeleton and renders nugatory all therapeutic efforts?

Often there is not a comfortable or well-fitting chair in the house for an adult, and for children there is no provision. Chairs are usually of two general kinds—big and little—those for adults and those for children of from 2 to 5 years. Styles in chairs vary, and the chairs we find in the home are practically always of the wrong shape for the growing child and usually for the adult. To fit, a chair must conform in the curves of its back to the normal, but not exaggerated, curves of the spine of the sitter. It must be of such a height that the feet can be planted comfortably on the floor and yet the knees will not be raised high above the level of the hips, and it must not be so deep that the pelvis does not readily come in contact with the back. The inclination should be such that the back of the sitter is really supported and not pushed forward when the body is set against it.

Manufacturers have made office chairs for adults which support the back well, some of them adjustable, and perhaps the reason why there has been no effort to fit children is that there has been no demand. Perhaps some day the dealer, if he can not fit a child, will be able to take his measure for a suitable home seat, or at least furnish one that has an adjustable support. Meanwhile, perhaps we can make some of our present chairs fit. This can be done by adjusting a suitable padding to the back by using a stool for the feet, or by sawing off part of the legs if the chair is too high, or by piecing out if the chair is too low, and by sawing off the front of the seat, or padding the back in front if the chair is too deep. The product of this overhauling may not be a thing of beauty, but that matters little if it is a thing of comfort and body preservation.

A normal child at rest in a misfit chair is always, for the time being, deformed; a normal child at rest in a chair that fits always assumes a correct posture. The child, unfortunately, is very uncomplaining about some things, and makes no outcry if his seat is not what it should be. Also, he makes no fuss if the table at which he works is too high or too low, or his book too heavy to be comfortably supported, or the light by which he reads is poor or badly placed. These matters should be taken into account in arranging conditions conducive to good posture, though they are of secondary importance.

Physical education is nothing more nor less than the establishment of correct bodily habits, and the habit of assuming good posture is a most important part of the physical education of every child.

THE EDUCATION OF CRIPPLED CHILDREN.

GWILYM G. DAVIS, M. D.

(*American Journal of Orthopedic Surgery, July, 1914.*)

Orthopedic surgery as a specialty is of comparatively recent growth. At present it can truthfully be said that in this country it has definitely achieved for itself a place as a distinct branch of surgery. It was formerly regarded as a department of general surgery and the general surgeon was considered qualified to practice it. The domain of general surgery has, however, of recent years so broadened, especially as regards the various viscera, that it is becoming recognized that it is impossible for one individual to qualify himself properly to practice in all departments. Orthopedic surgery demands of him who practices it qualifications which are quite at variance with those which fit one for other fields of surgery. Radical procedures characterize general surgery, but conservation is the

watchword of the orthopedic surgeon. His whole object is to conserve failing energies and restore useful function. A cripple is a menace both to himself and the community and is apt to become a burden on his relatives, his friends, and the public. The aim, then, is to improve his physical condition and character as to make him, to as great an extent as possible, self-supporting, self-respecting, self-reliant, and able and willing to take and perform his part in the communal life. In order to accomplish this it is necessary that the work must be done by those who are willing and qualified to do so. It is obviously useless to expect a general surgeon, actively engaged in general operative work, to take the time necessary to become familiar with the educational, functional, and vocational problems ever present in orthopedic cases. It is likewise obvious that, if he does not appreciate the problems involved, he is absolutely helpless to remedy them. Notwithstanding this sharp line between the orthopedist and general surgeon, the former has had to fight for his separate existence. Perhaps this is one reason why the attention of the orthopedic surgeon has too often been confined to the elaboration of a special line of orthopedic technic, to the devising of new operations, more ingenious appliances, novel methods of treatment, and the like. All these are to be desired, but there still remains a factor which, if ignored, will render most of the previous surgical work useless, and that is education. By education is meant training. Training not only of a limb, but of the body, the mind, and the formation of character.

If we ignore or lose sight of this fact, much of our work goes for naught. Of what use is it for us to labor for perhaps years to restore a limb only to find that the patient does not desire to use it after it has been restored. On one occasion I gathered together enough money to provide a one-legged man with an artificial leg. When, however, he found that if he used the leg it would interfere with his begging and posing as a poor, helpless cripple he would not take the artificial leg as a gift. Here we have a case in which the bad moral character of the individual rendered useless all the good offices of orthopedic surgery. It has already been pointed out by others that cripples, as they grow, acquire what has been called a "mental warp," which is in the highest degree detrimental to their development and progress. The orthopedic surgeon has been so busy with his surgical technic and work that I believe he has not given sufficient attention to this question of proper development. It is one of the greatest difficulties that humanitarians have to deal with to find that, after perhaps years spent in bringing a cripple to such a state that he is able to work, he does not desire to work. To find that during the time he has been under surgical treatment he has

become so backward in knowledge, so accustomed to rely on others satisfying and providing for his needs, and so fixed in his assurance of being taken care of in the future without effort on his part that, no matter how perfect in his ultimate, physical condition, he is not willing, possibly mentally not able, to do what he really should to contribute to the general welfare. It is not fair and it is not just that we as orthopedic surgeons should confine our work and efforts solely to the medical care of our patients.

We can do more and we should do more. Quite recently a turn for the better has been taken, but the problem is not a simple one. As an illustration: Suppose a child is treated by confinement to bed for one year, say, for hip disease. It seems to me that while the surgeon is treating the medical condition it is his duty, as far as he can, to see that its mental and moral condition does not deteriorate. It is not meant that the sick child should be disciplined and taught exactly as it would be were it well, but rather that the parents should be cautioned not to pamper and spoil it and foster habits of selfishness; also that it should be given such instruction as is suitable to its condition. If this is done, when the end of the year has arrived and the child is cured, it can resume its place among its comrades with the least possible handicap, both in regard to its knowledge and character. The father of a boy, 18 years of age, with coxalgia informed me that his son has had only two years of schooling. In this case the warped mentality was quite marked. These cases are not handled right, and while the responsibility lies greatest on the parents it is, to my mind, the duty of the orthopedist to advise and assist. We are not solely the medical attendants of these cripples, but also to a certain extent their guardians. We are the ones who, better even than the parents, can decide to what extent training can go hand in hand with treatment. Formerly doctors and nurses were the only attendants in our wards, but now we have, in addition, a teacher and worker who endeavors to aid in lessening the disability entailed by the disease. The State is beginning to recognize its duty in this direction and finds that it is good public policy to provide instruction for orthopedic patients. The public-school system has, in this city, provided our hospitals with several teachers, who do what they can to prevent the children falling helplessly behind in their studies. For the out-patient poor the corps of social-service workers here find a useful sphere. It is our duty as surgeons to work more in harmony with them. By so doing our medical work will become more philanthropic and their altruistic work will become more truly useful. It is not, however, only our hospital patients that are to be looked after, but our private patients should not be neglected. These latter can almost always be provided by

their parents with suitable teaching and training if only we, their advisers, call their attention to the necessity of preventing their crippled children from acquiring this undesirable "mental warp" and insist that they see that their education and training be not unduly neglected. This is a field which has not been recognized as it should be, but as our surgical treatment becomes more standardized, the sphere of our work becomes wider, and it is our duty now to do what we can, not only to treat cripples surgically but also to aid in their proper mental and moral development.

VARIABILITY IN THE RESULTS OF INTELLIGENCE TESTS.

D. D. V. STUART, Jr., M. D., Johns Hopkins Dispensary, Baltimore.

(*Journal of the American Medical Association*, July 25, 1914.)

Although measures for the detection of mental deficiency, and the estimation of its degree when present, are being rather widely discussed at the present time, there is one very important factor which has seldom been emphasized, but which must be taken into consideration in forming conclusions based on the use of intelligence tests. I refer to the possibility of wide variations in the results of such tests when applied to the same individual by different examiners, if the examiners do not take into account certain features which I shall state later.

In this paper I shall deal only with the Binet-Simon test scale, as adapted by the late Dr. E. B. Huey for use in the Johns Hopkins Dispensary; but as this scale is the basis of all the commoner forms of intelligence tests, it would seem that the possibilities for error, which must be guarded against in its employment, must likewise be considered in connection with the other varieties.

As part of a general examination and as a means of gauging approximately the extent of mental development in any given case, the Binet-Simon tests are of unquestionable value. Unfortunately, though, there is a widespread tendency among both physicians and educators to regard these tests as yielding estimates of the mental age of patients just as accurate from the scientific point of view as are the results of quantitative chemical analysis, and to disregard factors which, if given due weight, might alter materially their deductions.

Experience has shown that the Binet-Simon tests can not be considered to be exact in the sense that chemical tests are exact; and it is more than doubtful if intelligence tests can ever be made so. Many

things, of which I shall mention those that seem to me the most important, have to be taken into consideration in the application of an intelligence-test scale. The possibility of fatigue on the part of the subject, and to a lesser degree of the examiner, is one of these. The showing up of mental processes during exhaustion is a recognized fact, yet I have seen a physician put a thoroughly tired-out child through the tedious ordeal of a Binet test. The subject's home surroundings and the training he has received are others; for, though the scale is intended to be a measure of native intelligence and not of education, environmental conditions play a large part in an individual's ability to answer correctly certain of the tests, especially for the later ages. Again, and perhaps the most important of all, the personal equation as regards both subject and examiner must be considered, if these tests are to be properly used. For example, a timid or sulky child and an examiner with a brusque, harsh manner make a bad combination. Under such circumstances the subject is apt to grow worried or bewildered, and to fail on questions which, under other conditions, he would pass without difficulty. This is, of course, especially true of those tests done on a time basis. On the other hand, a too sympathetic or inexperienced examiner will often unwittingly suggest the proper responses to tests of which the subject has not the slightest real comprehension. Finally, a patient's general health may have considerable effect on his grading in an intelligence test. It is surprising how often an apparently low-grade subject is found to be suffering from defective vision or hearing, or some other pathologic condition, the relief of which is followed by marked improvement in his mental status.

These factors are too frequently completely ignored, with the result that diagnosis of mental deficiency is made when no deficiency exists, and, conversely, that parents are sometimes told that there is nothing the matter with a child who is in reality handicapped by an incurable constitutional defect. It is this point of variability in the results of the tests that I wish to illustrate by means of the appended table.

All the cases quoted are white males, pupils in the special class for defectives in one of the public schools of this city. In each instance the first examination was made in the Johns Hopkins Dispensary, and on the result of this first test was based the recommendation which was the means of obtaining the child's admission to the special class. The second and third examinations were conducted at varying times after entry into the special class, the training given in which is largely manual in character. The physical age is that reported by the person accompanying the child at the time of the first examination.

Variation in the results of intelligence tests, conducted by different examiners under different conditions.

Case.	Age in years.	First examination.		Second examination.		Third examination.	
		Date.	Mentality.	Date.	Mentality.	Date.	Mentality.
1. J. M.	15	Dec. 10, 1913	7+	Jan. 28, 1913	7+	Dec. 3, 1913	9+
2. L. K.	11½	Jan. 3, 1913	7	Jan. 15, 1913	5+	Oct. 27, 1913	7
3. D. F.	12	Jan. 15, 1913	9+	Dec. 10, 1913	10	Feb. 18, 1914	8
4. J. W.	10½	Jan. 21, 1913	7+	Dec. 3, 1913	9	Apr. 20, 1914	10
5. E. D.	9	Sept. 15, 1913	5+	Dec. 10, 1913	5+	Apr. 4, 1914	6
6. R. H.	13	Sept. 26, 1913	10+	Dec. 10, 1913	12+	Apr. 4, 1914	10+
7. L. P.	9	Nov. 1, 1913	5	Dec. 10, 1913	6+	Apr. 4, 1914	6
8. A. D.	14	Dec. 15, 1913	10+	Feb. 18, 1914	10+	Apr. 18, 1914	9+
9. H. T.	13	Dec. 31, 1913	7	Feb. 18, 1914	7+	May 9, 1914	8+

In the grading, a plus mark indicates that the subject received sufficient credits to pass at the mental age given, and any number of additional credits not exceeding four. Thus, "mentality 6" shows that the subject responded correctly to enough tests to enable him to grade up to six years, plus one or more additional tests, up to and including four. The examiners were, with three exceptions, physicians, the exceptions being postgraduate students in psychology at Johns Hopkins University. In only a single case was the same individual tested more than once by any one examiner. This was case 6, in which instance the first and third examinations were both conducted by me.

While the cases cited are too few in number to afford a basis for any general conclusions, it is nevertheless impossible to deny the significance of the results obtained. These show, as will be noted, variations of from one to three years in the estimated mentality of the individual subjects, the average being between one and two years. The final test, as compared with the first, shows apparent progress in two cases and apparent regression in four, while in three cases the first and last results coincide. In no case did all three tests agree. If each successive examination showed progressively higher mentality, the objection might be made that all the cases in the table happened to be subjects who had not reached their limit of development when first tested and that the special-class training had improved their condition. The fact that the majority show apparent regression or remained stationary contradicts this, and the only conclusion possible is that the differences in the results were caused by the variability of the tests themselves.

If intelligence tests, when conducted by examiners with a knowledge of psychology and psychiatry, show such great divergence in their results, the assumption seems justified that the variation would be even more marked in inexperienced hands. It would also seem that it is time to stop regarding such tests as an infallible method of determining a patient's degree of mentality, independently of other considerations.

PSYCHOANALYSIS CONSIDERED AS A PHASE OF EDUCATION.

JAMES J. PUTNAM, M. D., Boston, and others.

(*Journal of Nervous and Mental Disease, October, 1914.*)

The kind of education which this paper has in mind is that which has to do with ethics, religion, and philosophy. The thesis to be maintained is that psychoanalysis can render here a service analogous to that rendered by logical methods in all forms of reasoning. Psychoanalysis can, namely, help to detect false conclusions and false inferences dictated unconsciously by personal motives, such as craving for admiration and attention, undue self-assertion, concealed sensuousness, etc.; and there are certain basal principles of psychoanalysis reasoning bearing on these matters which parents and teachers could be trained to understand and to utilize as guides to observation and character study. On the other hand, the sciences of ethics and philosophy, and especially of logic, have something to teach which psychoanalysts could study with profit. The conflicts of psychoneurotics are often based in part on desires and crude logical inferences of good sorts. It would be intolerable and inadmissible for the physician to attempt to impose his own views as such upon his patients; but if well trained in logical method and the principles of sound ethics and philosophy he can at suitable moments aid them to develop their own views in desirable directions.

DR. MILLS said he feared that he was somewhat stupidly practical regarding certain psychological and other matters. He did not intend to discuss this able paper of Dr. Putnam's, but he would like to ask him two or three questions. What was running through his mind while Dr. Putnam was reading his paper was this: How are we as parents, how are we as teachers, to carry out the suggestions of Dr. Putnam? How are we to apply them practically? He would like Dr. Putnam to take a child, say, at three age periods—one at the age of 8, one at 12, and one 16 years old. What does he wish the parent or teacher formally to do? How is he to approach the child, how talk to, or instruct the child? How much time by the day or week should be devoted to this particular object? How is the teacher in the secondary, intermediate, grammar, or high-school grades to exercise his powers to the end desired by Dr. Putnam under our present system of education? Does not the child, after all, through our ordinary methods receive the impressions and guidance desired by Dr. Putnam?

DR. J. W. PUTNAM said psychoanalysis in childhood does not always find a sexual basis, nor develop it. He called to mind a patient brought to him, a child 10 years of age, who suddenly refused to go to school any longer. Neither the parents nor teacher could find the reason, and the family physician obtained simply a refusal.

The discussion in trying to find the cause brought the child into a more or less nervous condition, and she gradually refused to play and was unable to go to school. The child was brought to Dr. Putnam, and by questioning he found she was afraid to speak before her mother. He sent the mother out of the room and told the child he would not say anything to her mother about what she told him, without permission. After a few tears she told him she sat next to a little girl who was a good deal younger than herself. This little girl had a pencil and the patient had stolen it and had intended to give it back but had lost it, and that was her reason for not wanting to go back to school. This occurrence had brought this child to the verge of hysteria, and all the careful work on the part of parents and teachers had failed to get the child's confidence. A great many cases of disturbance in child life are based on the remarkable consciousness of the child. Slight faults are exaggerated into vices in the child mind. In a large number of cases there are overconsciousness and overexaggeration of very simple matters. Dr. Putnam felt that psychoanalysis in childhood is useful and will often unearth a great many simple faults. The child he had referred to went back to school, he had her permission to tell the parents and teacher, and he told her that all things would be straightened out by her giving 5 cents to the other child for a new pencil. There were no further developments in the case.

Dr. Southard believed that too much attention can easily be paid to consciousness, and especially to self-consciousness, in laying a basis for the theory of education. The theory of education can easily be overrationalized. Freudian psychoanalysis, it seemed to him, also overrationalizes all situations with which it deals. The proceedings of the Freudian so-called censor are probably quite too rational to be real.

The rise of voluntarism and pragmatism in the last century and in contemporary theoretical psychology represent a proper protest against the overrationalization of mental proceedings which Hegel surely represented.

From his own (possibly private) point of view he felt that the part played by concepts, ideas, intellectual schematism, in the operations we term psychic, has been overemphasized. The so-called psychic "traumata" (sit venia verbo) are to his mind far too intellectual and conceptually describable to be accepted as wholly convincing. He believed we have paid too much attention to educating the centers back of Rolando, or, roughly speaking, the posterior association center of Flechsig and too little to training the centers forward of Rolando; or, again roughly speaking, the anterior association center of Flechsig. Or, put another way, education should

consider the behavioristic data of the modern so-called objective psychology and not confine itself to the introspectionist data. And this point may be made independently of whether you wish to agree with his own lately expressed opinion to the effect (*a*) that so-called psychic behavior is a function of the anterior association center and (*b*) that introspection largely taps the posterior association center. If there be anything in this conception, no kind of introspection analysis, not even the most penetrative Freudian kind, is likely to get more than (at best) a kinesthetic history of some of the patient's most important activities; and such an analysis can not claim to rationalize such activities, because perhaps no rationalization is a priori possible. Training for power, therefore, may well desert the field of reason and consider the upbuilding of proper habits and inhibitory tendencies, to be known by their fruits.

Dr. ONUF thought, as psychoanalysis is rather a young science, it is worth while to consider what it has done up to the present time. The problem can be considered in two ways, the wider understanding it has given us of certain phenomena and its therapeutic value. Dr. Onuf thought that on the whole there has been more willingness to concede the value which psychoanalysis has given us for the understanding of mental processes and much more reluctance to acknowledge the therapeutic value.

Among Freud's followers there first was great enthusiasm and expectation of what psychoanalysis would do in the cure of psychoneuroses. Gradually, however, even the best men have found that the field of efficiency has to be narrowed in quite considerably and the conditions in which it has actually proven of curative value have become very few.

One strong objection to the treatment of conditions of long standing is that the method takes very much time, requiring a long duration of treatment, and even then the results are doubtful, so it would seem more and more that if anything is to be done therapeutically, it is to be done by applying the method to the young—to the child.

Similar facts have been brought before us by the study of the internal secretions. We now know that if a child affected with marked cretinism—he referred here mainly to the sporadic form based almost purely on hypothyroidism—is treated by thyroid-feeding at a very early age and remains under constant treatment, it will recover entirely, that is, it can be brought up to and maintained on a normal standard provided that the treatment be continued all the time, whereas, if the treatment is first installed in the adult, it is not efficacious any more or at least only partially if at all. This is a very trite, simple proposition in cases of well marked hypothyroidism. In very mild cases of this disorder, however, those which the interesting clinical studies of Hertoghe and Levy and Rothschild have taught

us to diagnose, the problem becomes a much more involved one, because of the difficulties of diagnosis, and many persons as they go along in life become permanently "crippled," so to say, because, when children, their condition was not recognized, and they could therefore never again receive the same benefit which they would have received had their condition been understood and the appropriate treatment applied in childhood. Dr. Onuf thought the same applies to psychoanalysis in this way that if certain mental traits and trends, needing correction, are recognized at a very early age through the guidance of psychoanalysis, proper educational means can be applied and gratifying results obtained, whereas, if the situation is not paid attention to, we have the condition before us of the plant that has grown roots, and in order to remove these without greatly disturbing the ground in which they are implanted, each root has to be followed to its smallest branches, a task almost impossible to accomplish. It is in this respect that Dr. Putnam's remarks are of great value, showing us how psychoanalysis may achieve the greatest results with expenditure of the least possible amount of energy.

Dr. Knapp conceded that the modern methods of psychoanalysis may give, even without symbolic interpretation, the absolute facts in regard to the case, of which he was himself very skeptical. He was forced to confess that Dr. Putnam's suggestion with regard to obtaining from the study of abnormal children a guide to procedure in the education of the normal child is a little bit indefinite. If we obtain data from the normal person the study may add to our knowledge, but the attempt to realize data for the normal from the abnormal is really putting the cart before the horse.

Dr. J. J. Putnam said that Dr. Mills's question was a very pertinent one as to what parents and teachers shall do in this respect. They should not, in his opinion, do anything formally except educate themselves. What we wished to help to bring about is that parents and teachers should make themselves better parents and teachers by obtaining a deeper knowledge of what their own motives and the influences that have affected them have been, and what a child's motives are and what the history of a child's life in reality is. He had no intention whatever of urging that either parents or teachers should use psychoanalysis, as such. He did, however, desire that physicians should study this important subject, and that through them a better knowledge of the psychology of childhood should gradually spread among the members of the community at large.

Dr. Adolf Meyer said that since the term psychoanalysis seems to make some people very uneasy, we might discuss whether or not we recognize any biological effects of experience on individual life. We

might try to find out what experiences, in children or adults, go with fairly regular effects. If that is the issue, no matter whether we choose the doctrine of Freud or that of simple common sense, it will dictate that which both Dr. Southard and Dr. Putnam probably had in mind.

TICS.

MEYER SOLOMON, M. D., College of Medicine, University of Illinois.

(*Interstate Medical Journal, January and February, 1915.*)

A tic, as defined by Brissaud, is a physiological act which, although originally functional and purposeful in character, has in the course of time become a habit, which is executed in a purposeless and meaningless manner. A physiological act, produced at first consciously and purposely as a psychomotor defense reaction to certain external stimuli or ideas, is repeatedly performed as a necessary protective response to the external stimulus or idea which arouses the psychomotor reaction. So frequently is this physiological psychomotor reaction performed that it becomes a habit, which is, of course, pathological, is brought into activity by no adequate external process or idea, and is apparently purposeless and meaningless from a biological and physiological standpoint.

The tic is not a purely motor act. On the other hand, the psychic aspect of the condition is extremely important and much in the foreground. There is an irrestrainable, irresistible psychomotor impulse to execute the particular act or acts in question. The performance of the act may be inhibited to a certain extent by the exercise of the will, but this conscious control of the will over the act is limited. Attempts to inhibit the execution of the act, when the impulse for its execution is present, is accompanied by a very disagreeable feeling of psychic tension, mental distress, pain, and restless anxiety, which increases in degree until the particular motor explosion occurs. This latter finally relieves the peculiar state of psychic tension and discomfort.

We thus see that tics are not pure motor reactions, but have an intimate and important psychic aspect. A tic is therefore a true psychoneurosis. There are, as we see, two distinct components to the origin and execution of the tic. One is motor; the other is mental.

VARIETIES OF TICS.

Tics vary in the number and extent of movements and in their variety or location. Tics may be (1) isolated or solitary, in which case there is a single, coordinated movement or localized tic, confined to a definite part of the body, as is seen, for example, in

winking of the eyelids; (2) compound or complex tics may occur, in which case several contractions occur simultaneously in different parts of the body; or we may have (3) a general tic, in which there is a general movement of the whole body.

It must be appreciated at once that the number of possible tics is considerable. This number is equal to the number of physiologically acting muscles. Most frequently, however, these violent, convulsive spasms of momentary duration which are characteristic of tics occur in the muscles of the face, neck, and upper extremities. Tics of the facial muscles are of greater frequency. They may be unilateral or bilateral. They are usually unilateral. When bilateral, they are most usually not symmetrical. The muscles of the eyelids, of the tongue, of the nose, of mastication, may be affected. Biting of the nails or the lips may occur. Blinking, frowning, raising the eyebrows, peculiar grimaces, may occur. Affection of the muscles of the neck may produce so-called mental torticollis (spasmus nutans, nodding spasm). Involvement of the muscles of the shoulders and arm produce sudden twisting of the head, shrugging of the shoulders, jerking of the hands. The muscles of the lower extremities are infrequently involved. Affection of the trunk muscles may be present, in which case we have the salaam convulsions or movements when the muscles of the abdomen are involved. The diaphragm, the muscles of articulation, and others are often affected, so that as a consequence various complicated respiratory spasms may appear, such as spasmodic acceleration or forced respiration, gurgling noises, eructations, yawning, sneezing spasm, laughing or weeping spasms, coughing spasm, barking, etc.

The onset of tic is slow. First, the facial muscles alone may be involved. This may spread to involve the muscles of the neck and shoulders (due especially to the involvement of the sternomastoid), and then the trunk and the extremities, and the muscles of speech and of respiration may be affected. When well developed and general, tics may occur in all parts at the same time or in rapid succession. Obsessive and abnormal impulses, psychasthenic, neurasthenic, or hysterical symptoms may complicate the picture. At first the purposive character of the tic may not be noticed. After some time, perhaps even years, a purposive aspect is seen, and the movement is recognized as an expression of emotion, habitual and intentional.

In individuals without defective mentality the intelligence is generally unaffected. In other cases, with marked neurasthenic, psychasthenic, and hysterical symptoms, various fears, doubts, and obsessions may be present. Actual delusions may occur, and in certain cases insanity may develop on the same psychopathic basis which permitted the development of the tics. Consequently ticqners may be dominated by certain morbid ideas of an imperative, ideational

nature. These are, of course, true obsessions, characteristic of psychasthenia. Thus there may be a morbid impulse to count steps, to touch every post in passing, etc.; or there may be an impulse to collect various articles or the tendency to perform certain peculiar mannerisms. When doubts are coexistent, the choice of a tie or collar in the morning while dressing may give rise to a serious problem which it may take the individual some time to solve. The latter condition, generally known as *folie du doute*, is also included under the term "psychasthenia."

While on the one hand, as already explained, these tics are only to a very limited extent under the control of the will, it is well known, on the other hand, that systematic occupation, distraction, and external concentration of the attention have a considerable influence in repressing tics. Attention devoted to the tic tends to increase its frequency, duration, and severity. Likewise, as mentioned above, fatigue, emotional upset, and states of irritability and anxiety increase it. When the individual is alone these tics may cease for a long time; but so soon as social relations are resumed, during emotional excitement, under mental stress, strain, or conflict, they tend to recur. Again, voluntary movements have quite a soothing effect upon tics.

ETIOLOGY OF TICS.

It is found that a neuropathic or psychopathic condition, generally hereditary, sometimes acquired, is the basic, underlying condition. Other members of the family are frequently affected with some variety of functional nervous disturbance. The patients themselves, as explained above, very often have other nervous disturbances, especially morbid impulses and obsessions of a psychasthenic nature. There is a lack of inhibition and control of the automatic movements under control of the nervous system. Henco tics generally occur in defective or disturbed states of action of the nervous system. We find that tics are frequent in children of nervous or neuropathic constitution, in the mentally defective, and in the insane. Although patients suffering from tics are, of course, not insane, insanity may, however, occasionally occur amongst ticquers later in life. As a rule, tic usually begins in early life, at any rate before maturity, especially between the ages of 7 and 15. Amongst important exciting causes we must include mental excitement or trauma, bad training in childhood, and disturbances of an emotional nature. Overstrain and infection are also mentioned. Mental conflict is always an important factor.

Under the heading of heredity, it may be mentioned that even direct heredity has been reported. However, the general neuropathic

heredity and not the tic itself is inherited, the latter developing by imitation or from some external or internal exciting cause. Improper training and imitation are important. It is argued by some that the tic tendency may be inherited. The particular variety of tic from which a patient suffers is acquired. It may be the result of an external irritation of some sort or may develop as a consequence of a certain idea or mental conflict, or both the physical and psychic factors may be antecedent.

PROGNOSIS.

The prognosis depends on the age of the patient, the duration of the condition, the mental condition of the ticquer, and the time and character of the treatment. It is important to mention again that there are slight, mild, and severe forms, and that the slight and mild forms are very frequent.

The slight forms, occurring in children, may be stopped early by training and corrections, and at times by threats, although it is not advisable to resort to threats, which are apt to aggravate the condition. As will be shown under the heading of treatment, the will to be cured may effect a cure, as Meige and Feindel believe. We must differentiate between a cure and a spontaneous temporary remission, in which latter case there is a great probability of a relapse taking place. Nor should we forget that one variety of tic may disappear only to be later replaced by another. In mentally normal children, when treatment is begun early with proper training, cure may be rapidly effected. On the other hand, the results are most unsatisfactory where cooperation is not obtainable and where defective mentality is present. It must be said that most cases are chronic in nature. Some last for months, while others, much too frequently, last a lifetime.

The writer will agree with the Freudians that there must be a cause for the appearance of these tics. This cause existed in the past. It has in the course of time been forgotten, but still exists somewhere in the subconsciousness of memory. This forgetting has been brought about by a process of dissociation from the original exciting cause. But the writer will not agree that this dissociation has been, of necessity, brought about by repression on the part of the individual, that by psychanalysis the condition can be traced back to the sexual activities or tendencies of infantile or early childhood origin, or that the condition may be cured when the original cause is made known to the patient through psychanalysis, without the training of the will so necessary in this condition.

Thus the analytic tendency of the Freudian school is to be highly recommended. But this analysis should not be limited to sexual analysis, but should include a consideration of all of man's instincts.

Nor should the analysis be limited to psychic factors alone, but should be viewed from a psychobiological standpoint. In this way only will all antecedent causative factors—physical and mental—be included in our analytic observation and speculation.

TREATMENT.

In addition to general hygiene, mental control is the essence of the treatment. Training in certain exercises is the method employed in practically all systems of treatment. Oppenheim advocates inhibitory exercises; Brissaud, Meige, and Feindel, psychomotor re-education; Pitres and Cruchet, breathing exercises; Taylor, various exercises of posture and attitude. Games, sports, and manual training should also prove of value in these cases.

In the case of children, stringency of the parents is always necessary. Persistency and regularity are essentials in all cases.

Each tic is an individual case.

It can not be stated too often or too emphatically that in every case the patient must be made to understand the treatment thoroughly, to cooperate whole-heartedly, to believe in the treatment and in the usefulness of it. His enthusiasm must be aroused and his will-power must be stimulated. In fact, we find that the patient must be continually influenced, daily or weekly, for months or years.

Complete success may take place in some cases. Partial success is frequent, and failure will often result.

THE PRESENT CONCEPTION OF CHOREA.

ISRAEL STRAUSS and others.

(*Pediatrics, March, 1915.*)

DR. ISRAEL STRAUSS read this paper, which he prefaced by referring to the many different hypotheses that had been advanced to account for chorea. He stated that it had been attributed to a hereditary tendency, to neuropathic taint, fright, and excitement. The more probable theory was that these were but predisposing causes, the disease itself being of infectious origin. The purpose of this paper was simply to weigh and discuss these different views. The relation of rheumatism to chorea had been noted and the suggestion had been advanced that they might be due to the same agent or that the one stood in a causative relation to the other. Possibly chorea was a meta-rheumatic condition, just as tabes and paresis were parasyphilitic affections. Authorities were by no means in

accord with regard to the embolic theory. One authority stated that 56 out of every 68 cases of chorea gave a history of rheumatism, and Thayer stated that 21.6 per cent of choreics had had rheumatism. To settle this question satisfactorily the etiology would have to be discovered in both conditions. There was evidence of the presence of the streptococcus in most cases of polyarthritis. Diplococcus and staphylococcus pyogenes aureus had been found in choreics and much biological work had been done by the different methods, complement fixation, aerobic and anaerobic methods, and the results differed widely. Chorea had been known to follow typhoid fever, malnutrition, syphilis, the abuse of alcohol, etc. It was a disease of early life and occurred most frequently between the ages of 6 and 15 years. It was more apt to occur in wet, cold seasons. It was frequently febrile in the early stages and gave evidence of endocarditis. The fatal cases showed the rugæ of endocarditis. What influence the cortex exerted was unknown. In fatal cases the brain lesions were those of acute encephalitis, and this brought up the question to what extent such lesions were present in the ordinary cases that went on to recovery. The probability was that this would never be known until some case of moderate chorea died suddenly and an autopsy was obtained. In the present state of their knowledge the only conclusion that was justifiable was that chorea was probably of infectious origin, but the data at present were altogether insufficient to decide the nature of the infection.

Dr. L. E. LaFetra said he quite agreed with what he had heard. It seemed that chorea must be considered as closely related to polyarthritis and must be considered as due to some kind of bacterial infection in the vast majority of cases. There were two points to which he wished to call attention: First, in Bellevue Hospital they had made a number of studies of the blood in chorea and in two of these the streptococcus viridans was found in the blood. Complement deviation tests by Dr. Hoobler were found positive in two other cases. In the second place, it had been observed that children who had just recovered from polyarthritis or acute endocarditis frequently developed chorea while still in bed. When the influences that were generally given as exciting causes of chorea were absent, when there was no fright, no malnutrition, no excitement, nothing in the way of nervous shock to account for the development of the chorea, one might feel quite positive that in the majority of cases chorea was an infectious disease. On the other hand, there were some cases that followed so quickly upon fright and nervous shock that it would seem probable that there were cases that had a basis other than that of infection.

Dr. Haberman said that no mention had been made of psychic chorea. He recalled a striking case that came to Dr. Starr's clinic some years ago. This patient had a chorea so apparently typical that Dr. Starr was about to show her to the students. For the relief of a headache, of which she complained, she was taken aside and treated by hypnosis. On awakening not only the headache disappeared but the entire chorea. After this Dr. Haberman treated a large number of choreics coming to the clinic psychically and found that in some the chorea disappeared at once, in others after a few treatments. These cases could not have been rheumatic chorea. In studying a still larger series he had come to the conclusion that psychic chorea was not uncommon, and that many, if not most, of the cases lasting over three months were of this nature; also that many of the recurring attacks in neurotic and hysterical children who might have had a real chorea in the beginning were psychogenic. The child was on the watch for a new attack, and so got it. These cases were all strongly amenable to psychic therapy. There was no way of differentiating the rheumatic from the psychogenic save by the result of treatment. Another series of cases was due to congenital syphilis. Millian in France, and Nonne in Germany had called attention to these cases; the former believed that he had found lues so frequently in the heredity of choreic cases that he thought chorea itself must be a manifestation of congenital lues. Few, however, had accepted his view. Nevertheless, there were cases certainly due to this factor. Dr. Haberman cited the case of a child whom he had recently treated, who had had chorea for three years and been treated by a number of physicians none of whom thought of associating the chorea with congenital lues, though the mother gave a positive Wassermann reaction. Antiluetic treatment speedily cured the chorea.

Dr. Henry Dwight Chapin said that Dr. Roger, the French clinician, had studied the relationship of rheumatism, endocarditis, and chorea many years ago, and had come to the conclusion that they presented the same underlying pathological condition, and it really seemed that up to the present time they had not gotten much beyond his view. It seemed undoubtedly that they were all of infectious origin. Where one of the three conditions was found, one was liable to meet the others.

Dr. Henry Koplik called attention to the importance of seeing these cases of chorea through years, for it might be said of chorea, "once a choreic always a choreic." Seeing the heart gradually becoming worse and worse led to but one conclusion, and that was that the poison causing the chorea was producing endocarditis. The way in which the term rheumatism was used to-day was most unfortunate; it was much like the former use of the term "malaria." It was

probable that the poison causing polyarthritis was closely allied to the one that produced endocarditis and chorea. The question was whether the habit movements were the result of or a continuance of a condition produced by infection. The cases which Dr. Haberman had spoken of as controlled by hypnotism could not, of course, be due to the same etiology as that associated with cases supposed to be due to infection. In many cases in which the blood cultures of cases of chorea had been examined the technique may have been faulty; in others a mixed infection may have been found. In several cases of chorea which he had had examined in this way nothing had been found in the blood. It was quite possible that the streptococcus might accompany the true organism, just as it might be found associated with the Klebs Loeffler bacillus.

Dr. Elias H. Bartley, of Brooklyn, stated that they had made cultures at the Long Island College Hospital of three or four cases of well-defined chorea and in none had they found any organism. This was not a large number of cases and it did not lead to the conclusion that there was no infection, but it did mean that the particular organism which had been mentioned had not been found. If this organism was the cause of the disease it must be constantly found in the disease, and as it was not found to be constant it could not be regarded as the cause of chorea.

Dr. Israel Strauss, in closing the discussion, said he quite agreed with Dr. Koplik that it was unfortunate to use the term rheumatism as was done, since no two or three men agreed as to its meaning. With regard to polyarthritis and chorea, they could not say that the streptococcus viridans was the agent producing these affections. Dr. Libman's work at Mount Sinai Hospital was such that they could not say that he was incompetent to isolate this organism if it was in the blood, yet they had not succeeded in isolating it from the blood in chorea, though they had made cultures aerobically and anaerobically. Personally he did not believe that if the streptococcus viridans was there it would have escaped notice. Another point in regard to the relationship of rheumatism and chorea—in chorea one did not get good results from the use of the salicylates; the results were not those obtained in polyarthritis. On the other hand they had tried neosalvarsan in chorea and sometimes with surprisingly good results. This suggested that a protozoon might be involved. They had no right to say that, because rheumatism occurred and was followed by chorea, the latter was due to the same cause as the former; neither could one say that, because endocarditis had been found in 21 per cent of the cases of chorea, the endocarditis and the chorea were due to the same cause. When one had a severe case of chorea insaniens, he could not, as a rule, save it, no matter what was done.

THE VOICE SIGN IN CHOREA.

WALTER B. SWIFT, M. D., Boston.

(*American Journal of Diseases of Children, October, 1914, and February, 1915.*)

In conversation vocal changes are short in duration, and hence difficult of perception. This suggested the prolongation of tests to make vocal change more easily perceived. The change recorded from prolonged tests must necessarily be the same changes elongated that occur in conversations where the sounds are short.

Twenty cases were then subjected to the following series of 27 tests, 540 tests in all:

1. Prolonged utterance of a as in arm.
2. Prolonged utterance of e as in eye.
3. Prolonged utterance of i as in ice.
4. Prolonged utterance of o as in old.
5. Prolonged utterance of u as in rude.
6. Prolonged utterance of a as in ask.
7. Prolonged utterance of e as in end.
8. Prolonged utterance of i as in ill.
9. Prolonged utterance of o as in odd.
10. Prolonged utterance of u as in up.
11. Consonant p.
12. Consonant b.
13. Consonant m.
14. Consonant t.
15. Consonant d.
16. Consonant n.
17. Consonant k.
18. Consonant g.
19. Consonant r.
20. Consonant l.
21. Consonant s.
22. Prolonged whisper.
23. Prolonged whistle.
24. Blowing the breath.
25. Holding the breath in inspiration.
26. Holding the breath in expiration.
27. Holding the breath in half expiration.

The purpose in trying so many tests was to expose all the forms and modes of vocal production to the choreic twitch, and in this way ascertain the mode and form acted on with highest frequence to serve as a single test adapted to routine clinical examination.

After tabulating 20 cases of supposed chorea, 4 were found recovered and 1 a question of hysteria. Excluding those 5, 15 are left of certain diagnosis on which to base results.

In general, variation in pitch and intensity occurred in two-thirds of the cases, pretty uniformly distributed over all the vowel sounds, long and short, with a slightly more frequent change in pitch than intensity. Therefore I place pitch first in mentioning them. There is, however, one marked difference in all these vowel changes. Long "a" is more marked in its change. This is a good reason for its choice as the routine clinical test. The explanation may lie in the open position of vocal agents in the utterance of "a" long, as in "are," thus allowing any contraction to show more in its effect than if exerted on a closed position of those agents as "e" in "end."

The whisper changed in pitch in three cases, in intensity in six, showing periodic cessation in three. The whistle showed irregularity

in three on expiration and in three cases on inspiration. One case entirely stopped whistling. Three cases could never whistle. One showed periodic cessation of tones, with no change in pitch or intensity determinable.

Consonants showed no change except when prolonged, where three cases showed "s" and "r" to change in pitch and intensity.

Air blow: Four cases were irregular; three halting.

Air held in inspiration, no change.

Air held in expiration showed one puff.

Air held in half expiration showed one puff.

There is sufficient uniformity and frequency in the appearance of vocal changes to warrant us in classifying changes of pitch and intensity as one of the signs of chorea, of equal dignity with the choreic knee-jerk of Shaw, the respiratory signs of Graves, and other minor symptoms.

The patient is allowed to sit or stand easily. The purpose is to obtain a fair amount of body relaxation. The operator, as an example to the patient, takes a deep inhalation and sounds for from 15 to 20 seconds the vowel "a" as in "are." Then instruction is given to the patient as follows: "Do that." This is an easy method to elicit the imitation of a prolonged vowel sound. If merely instructions are proffered they are usually not at first understood, and so it takes quite a time to explain a long breath, a prolonged tone, and just the exact tone desired. All this time and trouble is saved by the examiner's performance of the sound desired and trusting to imitation to bring the product desired.

The operator should then watch the sound produced and note any variation in it caused by the choreic contractions. If during this prolongation of "a" as in "are" a contraction occurs in the expiratory muscles, the sound will markedly change in intensity, and for the rest of the utterance, or until the occurrence of another contraction, the sound will return to its previous evenness of utterance. If during the sounding of "a" there occurs a choreic contraction in or near the vocal cords so that they are made more tense, the tone of that sound of "a" is thereby raised in pitch and then resumed at its previous level.

The test may have to be applied four or five times before the voice sign shows. Sometimes it occurs the first time tried and regularly every time. Rarely 10 trials are necessary. The typical choreic voice sign is a change in pitch and intensity. "A" is chosen for the clinical test because the mouth and passage are more easily touched by choreic contraction if widely opened than if constricted.

THE PSYCHOPATHIC CHILD.

FREDERICK J. FARRELL, M. D., Neurologist to Public Schools, Providence, R. I.

(*Archives of Pediatrics, September, 1914.*)

It must be remembered that a large part of a child's life is during a period of strain and stress, of conflicting and imaginative thoughts, and of habits often attended by serious consequences which may have a direct effect upon the child's ability to learn. Until recently the effort of observers has been to trace all difficulties in child growth to physical defects, which to the mental expert is highly fallacious. Because of having had its difficulties placed in the physical realm, many at their critical moments fail to develop to their proper capacity or to respond to life obligations.

Emphasis must always be placed upon the relation between personality and all types of nervous and mental disorders. It is always essential and will offer undoubted assistance in sizing up the case presented.

Parts of many personalities are shyness, sensitiveness, excitability, passion, which appear at a more or less early age. From this it has been argued that these characteristics are innate, or even hereditary. As a matter of fact, these qualities are frequently neither innate nor inherited. Early experience and improper development due to these experiences produce the results seen. They are not physical, but entirely mental.

Among these mental stigmata the nurse and educator must watch out for traits that, through their very nature, must be classed as psychopathic. Many of these may be cured, or at least checked, if taken in time.

For example, a nurse may see a convulsion, later a peculiar dreamy state in the child, and fail to make the necessary emphasis in her report, thereby making possible a foundation for further continued epileptoid states which might have been obviated. Through this neglect a personality is rendered possible which might otherwise have been quite different. The nurse should be on watch for poor sleep in the child, frightening dreams, nervous restlessness at night, variability in mood, headaches, for these may play a part in forming an abnormal personality and in producing psychopathic conditions which are absolutely preventable. It may be added that a number of so-called "bad habits," such as nail biting, bed wetting, facial tics, fits of temper, oversensitiveness at the sight of suffering, and the seeing of evil in the innocent enjoyments of life, may also be the forerunners of more serious trouble.

This condition has been well styled by Prof. Ziehen as psychopathic constitution. In his excellent monograph on "Psychopathic constitution" his major premise is that children with the psychopathic

constitution are not feeble-minded and are not insane, but belong to a class by themselves. I will try to show that such is the case, and also demonstrate the great difficulty in absolute differentiation between some types of cases.

These children usually present what might be called a fairly normal period of infancy. They begin to evince disturbances, such as poor sleep, extreme restlessness in bed, unrefreshed in the morning, troubled and frightening dreams. During the day they are moody, complain of fatigue at play, and evince great difficulty in their ability to work themselves out of a conflict, a tangle, or a temptation. The extent to which the individual is capable of readjusting himself and producing a proper and efficient reaction to problems will determine that individual's level.

In the psychopathic constitution the emotion bears close relation to external stimuli, whereas in the predementia precox to internal stimuli. Intellectual training has little to do with influencing the emotional life of such children; it is a component of the individual's personality. In the psychopathic constitution it is a breaking through of affectivity under poor associative control, whereas in the predementia precox there are changes in their affective life due to the breaking down, which causes disintegration of the whole personality.

Another factor referred to is fatigue, so frequently called laziness, distraction, or playfulness, what might be called normal reactions in a normal person, but which in the psychopathic child is an important factor in their disease process. School work is not the only cause of fatigue. Kahlbauhm once said that intellectual strain was one of the foremost of the contributory causes to this type of breakdown. Recent investigators have shown that intellectual overwork, exhaustive exertion, are the individual's attempts to meet a primary difficulty, and not factors themselves in producing the disease process. These activities are revealed not only at home and in the schoolroom, but also on the playground and give undoubted expression to the physical as well as the mental capacity of the child.

In treating and caring for such children it is not so much the putting of fresh, new, and well-groomed educational interests into their minds, as it is of diverting fundamental desires and interests into new channels and utilizing that same energy in other ways. Teachers recognize that they should present their subject matter in the way that appeals to the child, but very little effort has been made to seek out the difficulties of children and straighten them out according to the interests which necessarily require being appealed to.

The question now arises, how is this child problem to be met? In an ideal state a hospital school could be established where timely studies may yield the possibility of detecting those reaction types

which produce not only our feeble-minded, but also our insane and criminals. There, special investigations could be made by physicians, provision offered for making more efficient the public educator and for training the nurse as well as the child. There, levels of capacity, education, and readjustment of faulty mental habits could go hand in hand. It must be remembered that these children should be treated not as a class, but as individuals. Special care in the selection of teachers should be shown, a course in life habits should be established, and plenty of provision for amusement and diversion, stimulation of interest, and creation of new thoughts. Above all, the educator should be warned against instilling into the child unwise solicitude, and he should avoid the introduction of hyperconsciousness in the child in matters away above the child's intelligence.

THE NECESSITY FOR PARENTAL COOPERATION IN THE EXAMINATION OF MENTAL DEFECTIVES.

J. T. KRAUSE, M. D., Board of Education, New York City.

(*Medical Record, New York, August 22, 1914.*)

In order to have a thorough understanding of the case, not only the child but its antecedents must be studied. Who but the parents can supply such information? Other reasons why parents should be present at the examination will be described later. The family history is very important, as it frequently shows a direct transmission to the child of some hereditary taint. The history of the grandparents must be looked into. Were they normal individuals? Did they reach a ripe old age? Is there any trace of insanity, tuberculosis, or alcoholism among the brothers and sisters of either parent? Is there any trace of insanity, tuberculosis, syphilis, or alcoholism in either parent? Has there been any consanguinity in marriages? The value of such information is obvious. Much tact must be used in framing the questions so as to adroitly draw out this information without causing embarrassment. Having obtained a fair conception of the remote family history, the immediate family history is then in order; the number of births in the family, the number that have died, the cause of the death in each case, the educational attainment of each child. Such information will give the examiner an idea as to whether there are any inherent defects in the family.

The personal or developmental history is of utmost importance in studying the child. The mother usually can give valuable information, not only from the date of birth but during the prenatal period. Frequently a mother will volunteer the information that at a certain period during pregnancy she was subjected to a fright or fall. Prenatal influences play an important rôle in studying the development of the child. The history of the child during labor should be ascer-

tained. Was labor normal or was the delivery instrumental? If the latter, what damage, if any, was done to the child? If labor was protracted, how did it affect the child? Was it necessary to resort to artificial respiration? It is important to ascertain the physical condition of the child at the end of the first year. Did the mother notice any peculiarity at that period? Did the child differ from other children at that age? Did the child begin to cut teeth, walk, and talk at the usual periods? One can readily appreciate the importance of such information obtained from the mother who has watched the child day by day. The diet during the first year is very important. Was the child nursed or bottle fed? If the former, was the mother in good health? If the latter, what were the ingredients? The general health of the child during infancy must be ascertained. Did the child have any of the infectious or contagious diseases? Were there any complications, and if so, how did they affect the child? We all know that environment has a molding effect upon developing brain. The examiner must make inquiries about the home conditions. What are the environments at home? Are the sanitary conditions favorable to the normal development of the child? Does the child receive the proper hygiene? Is the child receiving a nutritious diet? Does the diet include harmful stimulants? With whom does the child associate? How does the child behave at home? The mother usually can describe the idiosyncrasies, if such are present, and which go to complete the picture of the child's development.

Aside from the fact that the parent can give a history of the case, the presence of the parent at the examination gives the physician an opportunity to study his or her mental caliber. Frequently the neurotic tendencies in the child are displayed by the parent at the examination. In many instances the examination of the child reveals certain physical defects which need correction; certain errors in diet or hygiene which need adjustment. It is a simple matter for the physician to make these findings known to the parent with a view to ultimate correction. In order to have the cooperation of the parents, it is not only necessary to say "Your child has enlarged tonsils and adenoids," but to explain how this obstruction mechanically may be responsible for the mental sluggishness of the child. Parents must be educated, and it lies within the domain of the examining physician to enlighten them on matters which are of vital importance. The presence of the parent at the examination seems to put the child at ease, and within a few minutes the apprehensive and evasive child recovers his equilibrium. This is particularly the case when the child is of the neurotic type and shows the characteristic lack of emotional control. To gain the confidence of the child is by no means an easy matter unless the parent is there with a cheering word.

THE MENTALLY DEFECTIVE AS CASES IN THE COURTS OF NEW YORK CITY.

MAX G. SCHLAPP, M. D., and LETTA STETTER HOLLINGWORTH, M. A., Clearing House for Mental Defectives, New York City.

(*New York Medical Record, February 17, 1912.*)

The present paper deals with but one group of delinquents, i. e., the mentally deficient, and comprises a careful statistical analysis of 520 cases from the courts of New York City, examined during the past 21 months in the Clearing House for Mental Defectives.

The table shows that comparatively few individuals in our group are below 10 years of age actually. The greatest number of juvenile cases appears at the Clearing House between the ages of 13 and 15 years—that is, at adolescence. A similar situation is shown in figures recently published from the Psychopathic Institute in Chicago by Dr. Augusta Bronner. Twenty-five of our adolescent cases were found after examination to be of normal intelligence and were diagnosed as mentally unstable. This condition, appearing characteristically at adolescence, and accompanying the somatic changes which take place at that time, may be transitory and recoverable or it may be the first outcropping of a fundamental neurotic weakness, which will affect the individual throughout life. Even with the imbeciles and morons it is often the case that unstable and criminal tendencies first manifest themselves at the beginning of adolescence.

Distribution of delinquents under actual ages and Binet ages.

Actual age.	Binet age.										
	Below 3	3	4	5	6	7	8	9	10	11	Above Binet.
5			1								
6	2				1						
7			1	1	2	2					
8				3	2	8	1	3			
9			1	1	6	4	7	7	3		
10			1		5	7	10	6	7		
11			1		4	1	11	6	11	6	
12		1	3	2	1	6	5	13	12	7	2
13				1	2	7	4	17	18	8	1
14			1	1	5	7	6	11	23	14	7
15				2	5	5	16	22	26	20	19
16					1		1	8	3	9	4
17						1	2	5	3	1	1
18						3	2	1	1	2	
19								4	2		
20							1		1		
21		1		1		1		3	2	1	
Over 21	1		1		1	3	1		1		1

The diagnoses of these cases ran as follows: In the table diagnoses are given without details of etiology, etc., which are given in the histories. For example, "retardation due to environment," "retard-

ation due to epilepsy," "retardation due to physical cause," etc., are all given in this table simply as "retarded."

Summary of diagnoses.

Morons	87	Epileptic	5
Imbeciles	84	Dementia precox	6
Retarded	66	Environment	10
Mentally defective (degree as yet undetermined)	50	Idiots	3
Mentally and morally defective	23	Not feeble-minded, but eccentric	4
Neurotic	36	Alexia and agraphia	1
Moral imbeciles	36	Alcoholic dementia	1
Normal	28	Wanderlust	2
Mentally unstable	25	Chorea	1
Moral deviates (N. F. M.)	29	Neurasthenia	1
		Hysteria	1

Theft and accomplice in burglary and truancy are the most frequent forms of delinquency. The adolescents, who are greatly in the majority among our cases, were classified in five groups with respect to mental age, and their crimes and misdemeanors were then tabulated in order to discover whether such an analysis would reveal any correspondence between the degree of deficiency and the nature of the delinquency. Individuals from 12 to 16 years of age were included and were grouped as follows:

1. At age and above, the Binet scale.
2. Ten to twelve years, mental age.
3. Nine to ten years, mental age.
4. Eight to nine years, mental age.
5. Below eight years, mental age.

Practically every charge noted in the total list of charges occurred in every group, but there was a notable difference in the relative frequency with which the various types of crime and misdemeanor appeared under these five mental ages. In the first group, including those at age or above the Binet scale, those offenses occurred most frequently which require a certain amount of personal initiative for their accomplishment—assault, grand larceny, attempted burglary, attempted suicide, and sexual offenses of an aggressive kind. In the second group, comprising those who showed a mental age of from 10 to 12 years, much the same charges were found as in the first group, except that truancy, arson, and disorderly conduct occurred with greater frequency. In these two higher groups such charges as improper guardianship, lost child, and vagrancy occurred with comparative infrequency. In third group, including those from 9 to 10 years of age mentally, the most frequent charges were sexual misbehavior, truancy, and theft. A very large percentage of the girls falls into this group, and these are the most frequent charges brought against them. In the fourth group, comprising

those 8 to 9 years old mentally, charges of improper guardianship, truancy, associating with vile and vicious persons, and petty larceny increase in number. Immoral conduct of an unaggressive kind is often charged. This is true also for the fifth group, which contains those under 8 years of age mentally, where charges of improper guardianship, vagrancy, truancy, lost child, peddling without a license, and general incorrigibility predominate. These are, of course, the offenses which have their source in a general tendency to drift about and a failure to perceive the social environment. They arise from a total lack of personal initiative, and are quite different from those noted in the highest group, where a certain amount of aggressiveness is necessary. However, it is not to be inferred that the lower grade of defectives includes only so-called "harmless" individuals, for occasionally a very vicious crime is reported among them. The general result of this analysis is about what might be expected, a priori, to eventuate.

Practically all offenses included in the general list were committed by members of both sexes. No crime which occurs with any considerable frequency is charged to one sex alone. Theft, truancy, sexual misbehavior, improper guardianship, incorrigibility, disorderly conduct, assault, etc., were charged to both boys and girls. But there is a considerable difference in the relative frequency with which these various offenses are charged to the sexes. The following table gives the percentage of the total number of each sex charged with the various offenses. The total number of males examined was 371; the total number of females 149.

Percentage of each sex charged with certain offenses.

	Theft.	Truancy.	Sexual misbehavior.	Improper guardian.	Incorrigibility.	Disorderly conduct.	Assault.
Male	28.0	15.1	5.2	7.8	14.0	4.8	5.3
Female	8.7	10.1	28.8	15.4	7.4	4.7	2.0

The proportion of females arrested for sexual offenses is nine times as great as that of males, but for assault the proportion of females is only half as great as that of males. For improper guardianship females are arrested, in proportion to their total number, twice as often as males, but only one-third as often as males for theft. The sexes are arrested in equal proportion for disorderly conduct, but males are proportionately arrested twice as often as females for general incorrigibility.

It is impossible to say how much of this difference is due to original nature and how much to the difference in social attitude and environment to which the sexes are subject from birth. It is ex-

tremely unlikely, for instance, that girls are proportionately nine times as prone to commit sexual offenses as boys are. It is much more reasonable to suppose, that, since sexual misbehavior is followed by such different results in the case of the two sexes, it is regarded by parents and society at large as a much more serious offense in the case of females, and that therefore girls are much more likely to be arrested for this offense than boys, though the latter may actually be more prone to it than the former. The results further suggest that sexual offense on the part of girls is more likely to be interpreted by parents, probation officers, and others as indicative of mental weakness than when committed by boys, and that girls are more likely to be brought not only to the courts, but to the Clearing House as well, on this account. In the matter of theft, likewise, the fact that, proportionately, three times as many boys as girls are arrested on this charge is probably no indication that boys have any greater innate tendencies to peculation than have girls. Boys are allowed to run about the streets, as girls are not, and thus form gangs and have much greater incentive and opportunity to steal than have girls.

In the course of a study such as this a certain amount of insight is gained into the social phenomenon known as the "gang." These gangs, formed among young boys, often persist as social entities after the members have reached maturity. The histories illustrate the relation which exists between juvenile delinquency and the "gang."

The following table gives the various recommendations concerning the cases. In some instances no intelligent recommendation for disposal could be made, owing to some technicality or circumstance connected with the case or to the lack of a proper institution in which to detain the patient. This latter condition was especially true of the moral imbeciles. There is no institution in the State to which these cases may properly be sent. Many of them can not be included in the category of the mentally deficient, hence can not be sent to institutions for the feeble-minded, and they have no proper place in reformatories, since their defect is congenital and incorrigible. Yet they constitute, if anything, a greater menace to themselves and the community than do those who are defective in the strictly intellectual abilities.

Recommendations for disposition (1913 and 1914).

Institutions for the feeble-minded	205
Clinic treatment	100
Change of environment	30
Strict supervision and discipline	34
Further observation	28

Institutions other than for feeble-minded	23
Physical treatment	14
Probation	9
Charitable aid, social endeavor	3
Big brothers	3
Deportation	2
Penal institutions	2
School	1
No recommendation possible	58
Total	520

There is, moreover, urgent need of State institutions for the criminally inclined who are at the same time definitely mentally deficient, for it is not socially just to commit the feeble-minded who are not delinquent to the same institutions where delinquents are detained. It seems likely that the State commission at present working upon this general problem will recommend the establishment of separate institutions for male and female delinquents who are feeble-minded, so that these may be segregrated from those who are mentally defective but morally harmless. The intelligent cooperation of judges and probation officers is doing more and more to bring the delinquent feeble-minded to the attention of the expert, but State provision must be made for the proper disposal of these cases or all the effort of judge, probation officer, and expert psychiatrist fails of its whole purpose.

Twenty-eight per cent of the cases showed bad family histories. These figures are undoubtedly too small, because in many cases it is practically impossible to obtain any family history at all, and in the majority of cases it is impossible to go beyond the grandparents in obtaining facts. It is obvious that a trustworthy statement regarding heredity should be based on nothing less than an examination of all the closely related individuals, exactly the same as that to which the patient himself is subjected. Statements by parents and other members of the family regarding the amount of insanity, criminality, feeble-mindedness, etc., among relatives will probably almost never tally with the results of expert examinations. This desirable procedure would have been impossible in most cases, even had the funds and the facilities for the work been available, for these patients were, in a large percentage of cases, immigrants of the children of immigrants, with most of their relatives in Europe. When criminality, insanity, excessive alcoholism, epilepsy, or feeble-mindedness is both recognized and acknowledged by the inexpert and often grossly ignorant persons giving the history, it is almost certain to have been actually present in a very marked degree, and, as stated, in 28 per cent of these cases the presence of such factors was reported. These results, to be significant, should be checked up by family histories

of a similar number of individuals taken at random in the community. The facts can not be properly interpreted as they stand, and are only given here as being of more or less incidental interest.

Sixty-eight per cent of the delinquents examined were attending school at the time of their arrest, either in the public schools or the parochial schools. They were distributed through the school grades as follows: Number attending kindergarten, 1; first grade, 21; second grade, 38; third grade, 69; fourth grade, 54; fifth grade, 62; sixth grade, 36; seventh grade, 8; eighth grade, 5; high school, 2; ungraded or special classes, 56.

Since but 28 of the total 520 cases were diagnosed as normal, it follows that practically all of these delinquents in the schools were afflicted with some form of mental abnormality. The mode for the group falls in the third grade, whereas the modal age of the group is 15 years. The modal school status of average children 15 years of age is in the high school. According to this table teachers may expect to find mentally abnormal juvenile delinquents in any school grade, but they are to be expected most often from the third to the fifth grades. For a complexity of reasons they seem to accumulate at this point in school progress. Comparatively few of them can get beyond the fifth school grade, but a great many of them can reach the third grade, where average children of 8 or 9 years are found.

Of these children in the schools, 48 per cent were found definitely feeble-minded, and were distributed as follows: Number attending first grade, 10; second grade, 10; third grade, 35; fourth grade, 23; fifth grade, 22; sixth grade, 14; ungraded, 48.

The great majority of the children had physical defects or symptoms of disease. These ranged all the way from carious teeth to serious conditions like syphilis and grave heart lesions. Some of the conditions were remediable by operation or medication, and the patients showed notable mental improvement after treatment in cases where the mental condition was one of "retardation."

Conclusions.—The facts observed here have certain implications which should be of interest to the public at large, and especially to those who are concerned with courts, penal institutions, reformatories, or any other phase of social rehabilitation. A large number of delinquents are undoubtedly mentally irresponsible, and in considering any particular case mental abnormality should occur as a possible causative factor. The only way to tell how many of the persons who pass through the courts are mentally abnormal would be to examine every one of them. At present only those are apprehended who are so obviously and flagrantly defective as to arouse the suspicion of persons inexpert in psychiatry. Many of the individuals finally brought to the Clearing House and diagnosed as

imbeciles or morons were "repeaters," with records of five or six appearances in court. Totally irresponsible and hopelessly incorrigible, they had simply drifted from one term of punishment or from one period of probation to another, unrecognized as mentally defective. A case in point is that of a girl of 16 years, a domestic, who had drifted from one place to another, discharged again and again for petty offenses, until at length she committed a serious theft and was brought to court. It occurred at last to one of the workers in the shelter to which she was sent "that there might be something wrong with her mind." She was brought to the Clearing House, where she was recognized after examination as a high-grade imbecile. All the philanthropic efforts that had been spent on her were absolutely wasted, for the girl was and always will be without insight into social situations. The penalty prescribed by law for the offense which she had committed was in reality irrelevant to her case. She could not be reformed, since she had not the power even to perceive the laws which she had broken, and there could be no social gain in sentencing her to a penal institution, since she was neither in any true sense responsible for her deeds nor able to profit by punishment.

Also in the case of those adolescents who suffer from mental instability, as described above, reformatories and penal institutions are not indicated. The outlook for these individuals is good if they can be placed in a favorable environment under wise supervision until the period of adolescence is past.

To those who have worked over the mass of material connected with these cases, and who realize what a small percentage of the total number of cases that pass through the courts yearly is here represented, it is clear that the great problem of individualizing punishment has as yet scarcely been even attacked. For many reasons it seems that the children's courts afford the best point of departure for the working out of a general scheme for social betterment in respect to the problem of delinquency. If every delinquent child could be thoroughly examined mentally, physically, and socially on his first appearance in the court, and disposed of according to the results of such examination, a great gain would without doubt be made toward the solution of the problem of adult delinquency. Several of the adult prisoners examined at the Clearing House had made their appearance in the children's courts while they were under 16 years of age. If these defectives could have been properly apprehended at that time, their subsequent crimes could have been spared to themselves and to the community.

However, as has been mentioned before, much progress has been made in recent years in realizing the fact that a problem exists. It seems well-nigh incredible now that only 15 years ago there was no

children's court in New York City, that children were tried and sentenced like adults. Mental and physical examination was unthought of. It was indeed the crime, and not the criminal, that was punished.

Recent investigations among inmates of various penal and reformatory institutions have revealed the following facts: The New York Reformatory at Elmira finds 37 per cent of its inmates clearly feeble-minded; the New Jersey Reformatory at Rahway, 33 per cent; the New York Reformatory for Women at Bedford, 37 per cent; the Massachusetts Industrial School for Girls at Lancaster, 50 per cent; and the Maryland Industrial School for Girls at Baltimore, 60 per cent.

A SUMMARY OF NERVOUS AND MENTAL FINDINGS IN FEEBLE-MINDED CHILDREN.

J. J. MENDELSOHN, M. D., Lincoln State School and Colony, Illinois.

(*Illinois Medical Journal, October, 1914.*)

A very noticeable feature of the feeble-minded as a class is the frequent indications of cerebral lesions and the diversity in their mode of manifestation. Practically all types exhibit along with their mental abnormalities varying degrees of impairment of sensory and motor functions.

Investigation of the nervous and mental characteristics of upward of 1,000 cases has furnished interesting data, the more important of which will be briefly summarized.

Sensory findings.—Impairment of the special senses is of common occurrence. Of 200 cases where the intelligence of the children admitted allowed of examination, deficiency in the acuity of vision was demonstrated in 38 per cent, myopia and astigmatism being the most frequent abnormalities observed. Inequality in the size of the pupils was present in 5 per cent of cases, strabismus in 11 per cent, nystagmus in 5 per cent, subptosis and ptosis in 4 per cent. In 3 per cent of cases the reaction to light was sluggish. Total blindness is relatively rare, there being but 12 cases out of 1,600, eight cases of which are due to ophthalmia neonatorum.

Auditory defect in varying degrees was present in 18 per cent of the above-mentioned group. Six per cent of this number had a history of either recent or remote otitis media. There were 19 cases of deaf-mutism in 1,600 children.

Smell and taste, while somewhat blunted, were not found to show any marked deviation from the normal in the higher grades of mental enfeeblement. The lower grades in many instances display extreme defect of these senses. Satisfactory tests for taste and smell are exceedingly difficult to obtain.

The greater number of cases examined show a slight diminution in the cutaneous susceptibility in pain and tactile stimuli. Difficulty in accurate localization is a prominent finding. About 8 per cent of cases exhibit hypersensibility, especially in pain. In idiots and epileptics cutaneous analgesia is occasionally found. While many cases find it hard to recognize the finer grades of temperature, insensibility to extreme grades of heat and cold were seldom encountered, except in idiots. Where stereognosis could be judged, it was found to be invariably good.

Abnormalities or organic sensations are often met with. Absolute idiots will give no evidence of the presence of thirst or hunger. More prominent is the tendency to gluttony. Painful sensation associated with visceral disease is often not apparent. Sexual instincts are frequently abnormal, such abnormality being much more common in males.

Motor findings.—Evidence of motor defect is more prominent than sensory. Paralysis, partial or complete, is found distributed through all grades of mental defectives, being, as a rule, more frequent and severe in those of lower mentality. In our cases indications of infantile cerebral paralysis is found in 15 per cent of the inmate population, constituted as follows: Diplegia, 68 per cent; hemiplegia, 25 per cent; paraplegia and monoplegia, 7 per cent.

Seven per cent of this group of paralytics have chronic hydrocephalus. In 6 per cent paralysis is residual in nature, function having been almost entirely restored. The paresis is, as a rule, spastic in character and is frequently accompanied by morbid involuntary movements, the most prominent of which are epileptic convulsions, which occur in 42 per cent of paralytics. Less prominent are athetosis, choreiform movements, and various forms of tremor which are met with in about 33 per cent of cases. Muscular incoordination is common in the majority of feeble-minded, especially marked in epileptics and paralytics.

The morbid condition of the central nervous system often manifests itself in overaction or weakness of the muscles, without any definite paralysis. Muscular overaction is evident in about 14 per cent of children. It manifests itself in various forms of excessive movements, apparently voluntary in nature, also in the form of tics and automatic movements, such as body swaying, nodding, tapping, rhythmical motion of the fingers, hands, and arms, continuous humming or droning. There is hypertonus of the muscles, with exaggeration of the deep reflexes. In contrast to this is found, with much less frequency and mostly in the more severe grades of mental defect, cases of deficient motor excitability. The movements are sluggish. General body balance is relaxed. There is hypotonus of the muscles with retarded reflexes.

Hyperextensibility of the joints, especially, the metacarpophalangeal, is often met with, especially in cases of organic defect.

Epilepsy is a frequent complication of feeble-mindedness, this condition being found in 16 per cent of 1,600 cases. Of this number, about 36 per cent show signs of organic disease. The grand mal type predominates to the extent of 95 per cent, the remaining 5 per cent being comprised by the petit mal and Jacksonian forms. Observation has led me to believe that every mental defective with an organic brain lesion is a potential epileptic.

Chorea is met with in both the acute and chronic forms in about 2 per cent of our cases. There are four cases which are fairly good examples of hypopituitarism; also a few cases representing the types of muscular dystrophies.

Abnormalities of speech are found to exist in about 65 per cent of feeble-minded children. The forms of abnormality are so diverse as not to permit of proper classification in a paper of this kind. Defects depending on the impairment of the motor speech apparatus, especially cortical anomalies, are most frequent, constituting about 62 per cent of this total. Such defects include, in their order of frequency, stammering, aphonia, or stumbling over syllables, stuttering, aphonia, motor aphasia, and other unclassified forms of impairment. Intellectual speech defect is next in order of frequency and is met with in 35 per cent, being almost entirely limited to idiots and the lowest grades of imbeciles. This includes cases where speech is absent or rudimentary, being limited to noise making, lalling, monosyllables, echolalia, and other varieties of psychic speech defect. Defect depending on imperfection of perception of sound or absolute deafness is found in about 3 per cent.

Mental findings.—The mental states in the feeble-minded are divisible into two chief groups—(1) cases where the defect is mainly intellectual; (2) cases where the moral defect is more prominent. The second group is more frequently encountered as the intelligence level approaches the normal. The intellectual level of 295 admissions, as graded by the Binet-Simon tests, resulted in the following findings:

Fifty were found to be idiots, namely, to have exhibited a mental age of less than 2 years. The physical ages of this group varied from 3 to 31 years, the average being 9½ years. One hundred and twenty-five comprised the imbecile group, with an intelligence age varying from 2 to 8 years. The physical ages of this group ranged from 6 to 43 years, the average age being 12½ years. Eighty-four were found to be of the moron type, their intelligence age varying from 8 to 13 years. The physical ages in this group ranged from 11 to 48 years, the average age being 16½ years. Considering the fact that an individual with a mental age of 8 to 13 years can frequently get

along in the community and is the last to gravitate to an institution for the feeble-minded, the size of the moron group is significant of the numbers of this type at large.

Twenty-four of this series were classified as backward, their mental retardation not exceeding 3 years, while 11 graded up to the normal requirements of the tests. Of these two groups of cases a few members were epileptic, some displayed reactions pointing toward a progressive increase in their mental retardation, while the majority showed varying degrees of incorrigibility and other evidences of feeble control of their moral reactions.

Defect in the power of attention is exceedingly common in the feeble-minded. This defect varies in intensity, depending as a rule on the severity of the mental deficiency. The profound idiot may be so markedly lacking in attention as to render any education a practical impossibility. The imbecile usually displays voluntary attention, but the character of the same is unstable, it being easily gained but as easily distracted. The same tendency is displayed in the higher grades, but in a milder form. The majority will show a childish interest in things spectacular, but the impression fades rapidly.

As a result of the defect of attention, all qualities depending on attention are correspondingly impaired. There is a lack of mental concentration. Comprehension is poor. The stock of ideas is reduced and there is a lack in the power of association. Acquired memory is also of necessity impaired.

A constant feature in the feeble-minded is a lack of judgment and reasoning power. While the higher grades will at times show a capability of reaching simple conclusions, their judgment is, as a rule, too limited to permit of a proper appreciation of right or wrong, except as they associate certain acts with punishment. Coincident with the lack of common sense, there is a deficiency of will power, with increased suggestibility.

The majority of cases are of indifferent temperament, showing a lack of constructive imagination with deficiency of the emotions. Sympathy and affection are for the most lacking—they are readily amused by the ridiculous, but not so easily touched by the pathetic. On admission to the institution the majority show little evidence of homesickness, readily adjusting themselves to institution environment and often doing quite well at routine work under supervision.

Vicious environment is capable of developing immoral tendencies in most feeble-minded children. There is a great percentage of cases, however, that show an innate tendency to degenerate traits of character. The intellectual defect is not pronounced, but the moral defect is prominent. The latter manifests itself in early incorrigible tendencies, such as dishonesty, truancy, "wanderlust," cruelty,

and destructiveness. Sex perversion is of common occurrence. In many instances there appears to be a total inability of comprehending social obligations. It is from this group of cases that the ranks of paupers, vagrants, thieves, prostitutes, sex perverts, and the like are often recruited.

Insanity as a complication of mental deficiency is deserving of mention. C. B. Caldwell reports that 11 per cent of the population at Lincoln "gave undoubted insane reactions in one form or another." Thirty-five per cent of this total he includes under the head of "Terminal dementia," a condition commonly found in the feeble-minded, especially the older patients. Dementia precox is met with to a similar extent, and is the chief active form of insanity encountered, the hebephrenic form predominating. Paranoiac states comprise about 5 per cent of this group, and involutional states, including melancholia, about 4 per cent. The remainder is constituted almost entirely by the demented and maniacal forms of epileptic insanity; rarely a case of juvenile paresis is met with.

HEALTH ASPECTS OF SCHOOL LUNCHES.

(Editorial in Boston Medical and Surgical Journal, April 1, 1915.)

The medical profession is to be credited with initiating the movement to feed children at school. Its beginnings in England, can be traced to a memorandum issued many years ago by the director general of the army medical service which followed the wholesome rejection of recruits because of physical disability. An investigation showed that the conditions responsible for this physical decadence were directly attributable to poverty, that this in turn was due to the change brought about by the rapid rise of industrialism following the adoption of labor-saving machinery, and that in consequence of the prevailing poverty the children were being reared as weaklings, incapable of resisting disease and largely impervious to education. As a measure of relief for this deplorable situation the inquisitorial council recommended a school-lunch service for needy children, to be maintained at the public expense. An examination of over 330,000 children (one-third of the school population of the city) by the medical inspectors of the New York health department in 1913 disclosed some 14,000 cases of malnutrition; and, on the assumption that the same ratio of this condition is to be found in the rest, there could be more than 40,000 children in the schools whose health is impaired owing to a malnourished system. It has been ascertained that in Cincinnati, of 36,438 children examined, 1,619 were suffering from malnutrition; in Cleveland, 671 of 61,578; in Newark, N. J.,

940 of 27,971; in Rochester, N. Y., 945 of 18,497; and in Worcester, Mass., 389 of 18,342.

While, of course, the provision of a suitable meal at noon is inadequate to overcome such malnutrition, the school-lunch service is undoubtedly a palliative measure of great practical service and one which can be made productive of a widespread influence for good. In the latest Monthly Bulletin of the New York City department of health there is published a valuable contribution on this subject by Edward F. Brown, executive secretary of the school-lunch committee of the association for improving the condition of the poor. From this it is learned that the New York school-lunch committee was organized in 1907 for the following purposes: (1) The provision of nourishing lunches on a self-supporting basis for public school children. (2) Special observation of children whose physical condition is such as to give evidence of lack of proper nourishment, in order to determine the underlying causes by a study of their homes and environment. An extension of this aim requires that these selected cases be followed up, to the end that the proper agency may be apprised and appropriate action taken. (3) The formation of special classes of mothers for instruction in the proper care of children, and particularly those suffering from poor nourishment. It will thus be seen that the work of this committee is very much more comprehensive than the mere providing of nourishing noonday lunches. The need for a school-lunch system, as Mr. Brown says, ought really to be regarded as a symptom of a serious social disorder. The necessity of feeding children at school usually arises from either a demoralized home, where the housewife has to work out, indifference of the housewife, or ignorance of home economics.

The service of a noon meal is at best to be considered inadequate for a number of reasons, among which may be mentioned the following: Behind each child in need of such a service is a home lacking the facilities for proper feeding; for such a child the need is just as great for its other meals and for feeding on nonschool days and in the summer recess; the presence in the family of children of preschool age; the fact that any desirable effect resulting from the scientific feeding of the child at one mealtime at school is likely to be destroyed by the kind of food it gets at home at the other meals. Properly, therefore, the feeding of children should be made part of a much larger social program. At the present time there are in New York 20 schools, registering 32,000 pupils, where the lunch system is operated. The need for such a service was naturally most urgent in districts where the people were impoverished, where mothers worked in factories by day, and where the children depended for food on the few pennies which purchased candy from the

vendors about schoolhouses. An experiment was tried in the equipment of a kitchen in a school building, where soup, sandwiches, puddings, and cocoa were provided at the rate of 1 cent a portion—the child being required to purchase first a bowl of hot soup. The caloric aggregates of some of the typical trays of food provided, the price of none of which exceeds a total of 3 cents, are given, and these are samples of them:

Vegetable soup	85.00	Bean soup	111.27
Egg sandwich	236.00	Bread, two slices	200.00
Rice pudding	108.76	Prunes	180.00
	429.76		491.27

Aside from its other advantages, the school lunch system affords an admirable opportunity to teach the children the science of feeding, including the purchase, preparation, and hygiene of food. Fundamentally the work is devoid of any mark of poor relief. During the last school term 1,249,489 portions of food were sold, for which the children paid $12,494.89. The service was not quite self-supporting, for a deficit equal to a little over one-third of 1 cent per portion was incurred, and this was made up by a benevolent lady.

Naturally in any scheme for feeding large groups of children where the prime object is the rearing of a vigorous race a scientific basis is essential. The working force of the committee is headed by a dietitian, who is responsible for the character of the food and service, and the principles on which food is selected are: (1) Nutritiousness, (2) palatability, (3) purity, (4) seasonability, (5) inoffensiveness to racial or religious preferences, (6) similarity to home food, (7) balance in accordance with food principles. When the committee is assured that an article of diet meets with these requirements a sample order of the raw product is secured, and it is then submitted to three tests—chemical, bacteriological, and food value. Cooperation with the health department is stated to have yielded the most encouraging results. Analyses have been made by it and also by some of the university laboratories. Furthermore, health authorities in other places have always aided when asked to inspect the manufactories in their communities. Where there is every indication that the product itself is pure, the place where the food is manufactured is inspected, and in purchasing preference is given to firms maintaining the best conditions.

The social value of encouraging trade where decent conditions of work and welfare prevail is, it is felt, not only a just recognition of good public service, but a rebuke to the manufacturer who thrives on adulteration, overwork, and underpay; and here one recognizes another measure in the interest of public health, for in the degree

that we demand livable conditions of labor shall we secure a diminution of incapacity, sickness, and death. Where foods are found to contain harmful matter, or where the conditions of manufacture or sale are unhygienic, information is laid before the health authorities for action. This usually prevents the further distribution of a product which is likely to cause injury, and thus there is an educational advantage in this system which can scarcely be overestimated. An additional precaution to insure the purity of the food dispensed is the careful scanning of the lists of convicted food adulterers prepared weekly by the health department. Of course, scrupulous care is taken to have the kitchen and service equipment entirely hygienic, and in order to prevent the possibility of disease transmission in the preparation and handling of food the committee had the health department make a thorough physical examination of all the school lunch employees, and also of a hundred children who assist in the service. The argument has often been advanced that the feeding of children at school causes shiftless parents to shirk their just share of responsibility in the nurture of their offspring; but this has not been found to be the case. On the contrary, the school-lunch employees, coming in contact with the parents in the districts, are often consulted regarding what foods to prepare for children at home, and how to prepare them. Certainly, the New York school-lunch committee is to be congratulated on the valuable and far-reaching work it is accomplishing.

CONSTIPATION IN CHILDHOOD.

J. P. Crozer Griffith, M. D., University of Pennsylvania.

(*Therapeutic Gazette, April 15, 1915.*)

We have first to deal with organic causes or those the result of some positive disease not directly connected with the intestinal tract. Rickets produces in many cases a tendency to constipation, the result of the atony of the abdominal and intestinal muscles, and of the consequent lack of proper expelling power. I have seen fissures of the anus make a child entirely unwilling to put forth the effort necessary to have an evacuation of the bowel. Such serious diseases as meningitis, peritonitis, and the like are constantly accompanied by constipation. In attacks of recurrent vomiting there is often such obstinate constipation that obstruction of the bowel is feared. Often, however, the symptom at this age is due to some functional disturbance, beginning even in the second year of infancy. We find constipation a common result of the administration of too much milk to the exclusion of a proper amount of other food. The diet in general is one which does not contain enough waste material. Another ex-

tremely frequent cause is lack of proper training. The children are unwilling to take sufficient time for an evacuation of the bowels, unless this is insisted upon. Such disorders as general debility and anemia brought about in any way diminish the tone of the bowel as well as of other parts of the body, and favor an insufficient peristalsis. Even in healthy children a lack of sufficient exercise is a common cause of this condition. I have known children who were obstinately constipated in wintertime, but had no trouble when spending the summer in the country. Finally, one of the most frequent causes of very troublesome constipation is chronic intestinal indigestion, going by the name of mucous disease and many other terms.

In older children the relief of constipation is usually very important but often very difficult. The whole dietetic and hygienic conditions which surround the child must be studied, as well as the state of the general health. In some cases a large amount of exercise suffices. I recall one little boy to whom I gave purgatives of such strength that I was afraid to increase them further, yet without any effect at all. When he was taken to the mountains for the summer the exercise which followed the climbing up and down the hills was sufficient to relieve the difficulty entirely. Massage of the abdomen is one of the best procedures in obstinate cases. Naturally, general tonic remedies are often required, especially cod-liver oil, when it is well tolerated; and all such conditions as anemia, rickets, and the like are to be removed by treatment. The insisting upon a regular visiting of the toilet at a time of the day when there is no hurry is one of the best of remedies. The choice of the hour is, however, important. It is foolish, for instance to have a little child go to the toilet at a time of day when he knows that in a few minutes the start for school must be made. Nothing can be gained by this, for at this age, as in adult life, mental quiet and peace of mind are necessary. Further, food should be selected which is of a laxative nature, such as stewed prunes or other fruit, asparagus tips, string beans, spinach, stewed salsify, lettuce, and the like. At this time of life the addition of a rather large amount of butter is of service, or of cream, if it is well tolerated; and it is better borne now than in infancy. Of the cereal porridges, oatmeal is to be preferred, and graham bread should replace entirely the ordinary white bread. I have had excellent results, too, with bran gems, made in the patient's home according to the recipe given in some of the cookbooks. Sometimes these alone are sufficient to control a constipation which has been very troublesome. In many cases it is necessary to reduce the amount of milk, and constipation will not be relieved until after this has been done. The occasional administration of figs, dates, or French prunes is of value when children refuse the ordinary cooked fruit or other table food of a laxative nature.

Of purgative drugs, which should at best be but a temporary makeshift, perhaps preparations of cascara are the best, and with these may be combined phenolphthalein or senna. Paraffin oil has come into prominence of late and is useful in many cases. It may be given undiluted, if children will take it, or mixed with peppermint or other flavoring substance.

WATER AS A GASTRIC STIMULANT.

(Editorial in Journal of the American Medical Association, January 2, 1915.)

It is considered by many that water should be taken sparingly, if at all, during mealtime. The recommendation to avoid the ingestion of an abundance of water along with the food is not without an underlying belief in its therapeutic propriety and helpfulness. A custom so well established must express some supposed efficiency of action. The basis for the widely circulated rule that water should never be drunk until long after a meal is eaten probably includes one or more of the following assumptions: (1) Drinking water while eating unduly dilutes or moistens the food, thereby obviating a desirable degree of mastication and insalivation. (2) The water dilutes the gastric and other juices to an abnormal and undesirable extent. (3) The food materials are caused, by the large volume of water, to leave the stomach at an unduly early period in the gastric cycle, before the digestive changes that ought to be brought about in this organ have been satisfactorily inaugurated.

If in truth these phenomena were in whole or in part undoubtedly provoked by the ingestion of water with meals, alimentary disturbances might well be expected to follow. As a matter of fact, a large number of experimental data collected on both man and animals by Hawk and his collaborators have failed to disclose any impairment in the utilization of the foodstuffs under the influence of even exceptionally abundant intake of water at meals. This has been verified further by newer experiments of Orr in Aberdeen. Indeed, Hawk goes so far as to suggest that the drinking of water with meals exerts even a desirable influence on a number of the most important of the activities and functions of the gastrointestinal tract.

Without considering in detail the various alleged beneficial effects, such as the decrease in the development of intestinal bacteria and the consequent diminution in the activity of the putrefactive microorganisms, which are held to follow the liberal use of water with meals, we may appropriately consider one important phase of the question on which the features just cited are made to depend. Hawk has freely stated that the entrance of water into the stomach stimulates the flow of gastric juice. Not only this, but the juice as secreted

has a higher concentration of acid than that produced previous to the entrance of the water. After stimulating the gastric secretion, the main bulk of the water very quickly enters the intestine, but it does not carry with it any appreciable part of the solids present in the stomach.

The assertion that water can function as a stimulant of gastric secretion is by no means a new one. The favorable action has repeatedly been demonstrated on animals, and only very recently by the Chicago physiologists Carlson, Orr, and Brinkman. In addition to such evidence, and to the indirect indication that water acts as a gastric stimulant in the human organism, there is now offered direct proof obtained on man. Bergeim, Rehfuss, and Hawk note that water (ordinary or distilled), either cold (10.5° C., 50.9° F.) or warm (50° C., 122° F.), is a very strong gastric stimulant and in certain instances yields an acidity of over 100 (cubic centimeters tenth-normal sodium hydroxide to neutralize 100 cubic centimeters of juice), in less than 20 minutes. As small a volume of water as 50 cubic centimeters has been demonstrated to have a pronounced and immediate stimulatory power in the human stomach. In the average normal individual, water produces fully as great a stimulation (as measured by acidity and enzyme values) as does an Ewald test meal, and the acidity values follow a similar type of curve. A simple water meal might therefore be substituted in many instances for the Ewald meal, and has the additional advantage of demonstrating any food residues. It was impossible to demonstrate any pronounced glandular fatigue in the human stomach. Identical volumes of water introduced into the stomach of the same man at different times during the same afternoon yielded very similar acidity values. Under all conditions the increased acidity following water stimulation is accompanied by increased peptic activity, although the two types of values do not necessarily run parallel.

In one human subject the Philadelphia investigators obtained definite evidence that 500 cubic centimeters of water left the stomach in from 10 to 20 minutes after its introduction. The occasional efficiency of the stimulus is shown by the fact that at least 225 cubic centimeters of gastric juice of relatively high acidity were secreted after an initial stimulus afforded by 50 cubic centimeters of distilled water.

The stimulatory power of the water was not influenced in any uniform way by the volume of fluid introduced into the stomach. In some instances a small volume of water gave a pronounced stimulation, whereas in other tests the response was relatively less pronounced when a larger volume of water was employed. How radical the suggestions following from these newer gastric studies are is

indicated by the proposal that since water stimulates the gastric glands to activity when no food is present in the stomach as well as when there is a digestive task to complete, it would seem a waste of "glandular energy" to drink water between meals. It would seem that water could best further the digestive plan when taken with meals.

THIRD PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE EXAMINATION OF AIR.

(American Journal of Public Health, March, 1915.)

The committe on standard methods for the examination of air made its first report in 1909 (published in the American Journal of Public Hygiene, XX, 346) and presented a second progress report at the Washington meeting in 1912 (published in the American Journal of Public Health, III, 78). The field of work which falls to the committee is a large one, and it has not yet been possible to arrive at definite conclusions in regard to the best procedures for certain specific purposes. By 1916 it is hoped that a fairly complete report can be rendered and the committee discharged. At the present time the committee deems it best, in accordance with its previous policy, to present a report of progress, setting forth the advances made during the past two years and the present status of the various subjects under consideration.

The principal determinations which have occupied the attention of the committee are five in number: (1) Temperature and humidity; (2) dust; (3) carbon dioxide; (4) bacteria; (5) poisonous gases and metals.

The methods for the first, third, and fourth of these determinations are now well standardized and reasonably satisfactory. The second and fifth require further study.

(*1*) *Temperature and humidity.*—The standard methods recommended in 1909 for the measurement of temperature and humidity—the recording thermometer and the United States Weather Bureau sling psychrometer—continue to prove entirely satisfactory for practical purposes.

Two new types of psychrometer have recently been suggested, both of which seem of value for special purposes.

The first is a small portable psychrometer suggested by Howe (American Journal of Public Health, III, 784) for use in street cars and other confined spaces. In this device the wet bulb is dipped in Japan gold size, covered with leaf gold or copper foil, and then coated with platinum black. A current of air is produced by means either of a small electric fan or of a cautery bulb, and the coated wet bulb is said to respond with great rapidity and accuracy.

Another important advance in psychrometry is the recording psychrometer made by the Bristol Co., in which the expansion of an inert gas in wet and dry bulbs is transmitted through tubes to a recording clock dial of the usual type. This apparatus has been used for nearly a year in experiments carried out under the observation of Profs. Phelps and Winslow, of your committee, by the New York State commission on ventilation, and has proved itself entirely satisfactory.

(2) *Dust.*—In its 1912 report the committee particularly mentioned two procedures for dust determination—the ordinary sugar filtration method and a method in which the dust particles are collected by directing a current of air against a glycerinated plate.

Two objections have developed to the sugar-filtration method—the inaccuracies due to dust present in the sugar and the small and therefore somewhat unrepresentative samples which can be dealt with. In order to avoid the errors due to dust in the filtering medium, the use of resorcinol instead of sugar has been suggested. This medium has been tested out by several members of the committees and proved superior to ordinary brands of sugar. A particular brand of sugar sold under the name of Crystal Domino Granulated was finally found which is practically free from dust, being superior even to resorcinol.

The sugar-filtration method, as described in the previous reports of the committee and with the specification of clean sugar as a filtering medium, seems on the whole satisfactory for the study of the rather minute but not submicroscopic particles which occur to the number of some 100,000 to 500,000 particles per cubic foot in ordinary indoor and outdoor city air. These particles Prof. Whipple and Mr. M. C. Whipple (American Journal of Public Health, III, 1138) find to average about 3 microns in diameter and to range from 0.5 to 15 microns. Prof. Whipple has used this method extensively and has brought out some very interesting local differences in dust content by its use. Thus samples taken at the various stories of the Woolworth Building in New York showed a progressive decrease in dust count from 221,000 dust particles per cubic foot at the street level to 27,300 particles at the fifty-seventh story. The numbers found in indoor air are higher. Prof. Whipple found that the air of the Y. M. C. A. College Gymnasium at Springfield, Mass., contained usually more than 100,000 particles per cubic foot, and sometimes 400,000. Profs. Baskerville and Winslow, in the study of 658 samples of New York City schoolroom air, found numbers ranging as a rule between 200,000 and 400,000 particles per cubic foot, a few high samples raising the average to 600,000 (American Journal of Public Health, III, 1158),

In the study of the air of a dusty office building in New York City Prof. Winslow found an average of 485,000 particles per cubic foot in 15 samples collected while dry dusting was not going on, while 19 samples collected during the process of dusting gave an average of 694,000 particles.

Prof. Whipple has applied this method of dust counting to the study of the efficiency of commercial air washers, with the result that a number of types tested removed an average of only 54 per cent of the dust particles in the incoming air.

Altogether it may be concluded that the sugar filtration method is a very satisfactory procedure for the study of the small dust particles (3 microns and thereabouts) which are present in almost all air to the number of 10,000 and more per cubic foot. In the study of industrial dusts, which are the dusts of vital importance from a sanitary standpoint, we are concerned with larger but less numerous particles. When 2 or 3 cubic feet of air only are filtered, and the dust filtered out is suspended in a Sedgwick-Rafter cell and counted, these less numerous but large and dangerous particles are apt to be lost. Thus studies made for the New York State commission on ventilation by the sugar filtration method failed to show any material difference between the air of a hat factory and that of the city street.

What is needed for the industrial dusts is some method by which a larger volume of air may be examined. This end is accomplished by the method in which a current of air impinges on a glycerinated plate discussed in the 1912 report of the committee. Studies made during the past year for the New York State commission on ventilation have, however, shown considerable errors in this procedure, a material proportion of the dust being carried over and past the glycerinated plate without adhering to it. The Chicago association of commerce committee on smoke abatement has obtained interesting results by filtering large volumes of air through a soxlet paper thimble filled with cotton and subsequently weighing the dust and examining it under the microscope, but the collection of a sample by this procedure occupies six hours.

An ingenious device for throwing dust particles out by centrifugal force in a rapidly revolving tube has been suggested by M. W. F. Wells, of the United States Hygienic Laboratory, and is now being tested out by members of the committee.

It is the feeling of your committee that the sugar filtration method is reasonably satisfactory for the study of the smaller and more numerous particles in air, but that the question of the best procedure for enumerating the larger and less numerous particles produced by industrial processes requires further study.

(3) *Carbon dioxide.*—The experience of the last two years tends to show that the modified Petterson-Palmquist apparatus recommended in the 1912 report of the committee is entirely satisfactory for all practical purposes. Under most conditions samples of air may most satisfactorily be analyzed directly in the field by the use of this apparatus. Where this can not be done, as in railway cars, for example, the samples must be taken to the laboratory for analysis, and under such circumstances the sampling method recommended in the 1912 report of the committee have proved successful. The carbon dioxide question seems, therefore, to have been satisfactorily solved.

(4) *Bacteria.*—The method recommended by the committee in 1909, with certain minor modifications suggested in 1912, has been extensively used during the last two years and has given excellent results.

Profs. Baskerville and Winslow examined 684 samples of New York City schoolroom air by this procedure and the New York State commission on ventilation has examined 353 samples of air from both indoor and outdoor sources. The general results (from a paper by C. E. A. Winslow and W. W. Browne published in the Monthly Weather Review, XLII, 452) are cited below:

Average microbic content of air from various sources

Samples.		Microbes per cubic foot.		Streptococci per 100 cubic feet.
Source.	Number.	20° C.	37° C.	
Country	85	56	30	12
City	134	72	32	11
Offices	87	94	80	22
Factories	47	113	63	43
Schools	684	96	.....	30

It will be noted that a determination of mouth streptococci is included in this table. The estimation of these organisms as indices of buccal pollution was discussed in the 1909 report of your committee and dismissed as unnecessary. Recent studies have suggested that under special conditions it may be worth while to take them into consideration. Nolte (Annals Missouri Botanical Garden, I, 47) reports very high results (one salivary coccus in 10 cubic centimeters, in 1,800 cubic centimeters, in 1,950 cubic centimeters, and in 3,600 cubic centimeters of air, respectively) in crowded street cars where pollution from mouth spray is gross and immediate. When streptococci are to be isolated the simplest method would seem to be to pick characteristic colonies from litmus lactose agar plates made in the usual manner. The production of acid in lactose broth and the

presence of spherical cells (not usually in long chains) are the only tests necessary for the identification of the common type of salivary streptococcus.

(5) *Poisonous gases and metals.*—In the 1912 report of your committee it was pointed out that the formulation of methods for estimating the poisonous substances found in the air of certain industrial establishments was an important task which fell properly within the scope of the committee work. Methods for determining carbon monoxide and wood alcohol suggested by Dr. Graham-Rogers were outlined in this report.

In addition to carbon monoxide and wood alcohol, your committee believes that tests for sulphur dioxide, amyl alcohol, amyl acetate, and perhaps other poisonous fumes should be standardized. For lead and zinc, satisfactory methods are already available.

Your committee plans to devote its attention to the problems of dust and of poisonous fumes during the next two years and hopes to make a final report on these and all other phases of the subject in 1916.

T. R. CROWDER,
C. T. GRAHAM-ROGERS,
E. B. PHELPS,
G. C. WHIPPLE,
C. E. A. WINSLOW,
Committee.

TESTS OF VENTILATING PLANTS.

FREDERIC BASS, Minneapolis.

(*Journal of the American Medical Association, November 7, 1914.*)

During the last year I have conducted certain experiments under the direction of the New York ventilation commission on school children subjected to two systems of ventilation. In one room air was supplied from outdoors, in another the air was recirculated, being continuously washed, lowered in temperature, and returned to the room. Not all the characteristic odor of the occupants of the room was removed by the washing. Careful tests, both physical and psychologic, conducted by trained observers failed to show significant differences between the two groups, although the period of observation was four months. The teacher in the room in which the air was recirculated, however, complained that other teachers told her that she ought not to teach in a room in which "fresh air" was not supplied, and she said that her doctor told her it was making her ill. She did not believe that it was good for her, and she complained of

feeling ill. The children were perfectly happy and entered no complaints. Their physical and mental progress was satisfactory, but as they were but 9 years of age they had not acquired the olfactory sensitiveness of the older person. The system was good, so far as hygienic conditions were concerned, but it probably would not do for adults on account of the irritation resulting from odors.

The carbon-dioxide content of the air of this room did not rise above 30 parts per 10,000, showing a considerable leakage of air to and from the outside of the building. Air leakage is greater than is usually supposed.

While very humid air prevents the escape of bodily heat by evaporation, it is true that very dry air, especially when warm, may injuriously affect the mucous membranes, although I have no definite information on this point. The artificial humidification of air in cold climates is doubtless a most desirable part of a ventilating equipment. The washing of air to remove dust is of very great importance in certain cases.

If these conclusions are accepted, the requirements of a system of ventilation are that it supply air of proper temperature and humidity without offensive odors, that it supply it in sufficient quantity to maintain the temperatures and humidities within prescribed limits, and to remove offensive odors.

In order that this may be effectively done, the distribution of the inlets and outlets for the air must be carefully selected in accordance with the needs of the situation. Kitchens and toilet rooms should have outlets at the ceiling, with accelerating coils as near the base of the vent duct as possible. No air should be forced into such rooms, as it might be expelled into the rest of the building through the doors.

The tests which should be made may be listed as follows: (1) Temperatures; (2) humidities; (3) air currents; (4) odors; (5) carbon dioxide content; and (6) dust content.

No standardization has as yet been achieved. State and municipal legislation is almost entirely based on quantity of air, the requirements in many cases being expressive for well-designed systems of air distribution. It is of little value to pump 30 cubic feet of air per person into a room when the person can get but 3 of the 30 cubic feet on account of the lack of good distribution.

The temperatures and humidities should approximate those of the climate as nearly as possible. In England 58° with 60 per cent of relative humidity is common in the schools; this would be impossible in Winnipeg in winter.

Air currents are difficult to control, as they are extremely sensitive. The control of air currents may be said to be one of the arts of ven-

tilation. In hospital construction, except in crowded city locations, in warm climates open-window ventilation may be entirely practicable throughout the year for rooms and small wards. In such cases only kitchens, toilets, and possibly operating rooms need to be ventilated by special equipment such as fans, etc. The determination of air currents is, then, of little importance. The work of Shaw in England in the determination of air currents is perhaps the most worthy of note.

In small hospitals I have seen excellent results by having vent registers at the ceilings of the rooms connected to ducts terminating at the roof, accelerating coils being inserted. Entering air is not controlled, coming entirely from leakage.

In large hospitals such a system is inadequate. While practicable, it is likely to be expensive in operation. As the building increases in size, the problems of ventilation increase still more rapidly.

The operation of the ventilation system must necessarily be left to the operator of the power plant. It is useless to expect good service from the average engine-room operator without the direction of some person who understands the object of the ventilating system. The operator must be under the direction of one person and not many. The system must be designed with a view to its successful operation, which should mean a careful analysis of demands which are to be made on it. These demands should rest on physiologic standards which are yet far from establishment, although their general nature seems to be well forecasted.

In conclusion, I would again emphasize the point that studies of ventilation system and ventilating equipment be made with their objects clearly in mind, namely, to secure proper temperature and humidity regulation, to keep the air in motion and properly distributed, and to prevent offensive odors from circulation.

THE EXPERIMENTAL METHODS OF THE NEW YORK STATE COMMISSION ON VENTILATION.

Yandell S. Lee, Ph. D., College of Physicians and Surgeons, Columbia University.

(*Proceedings of the Society for Experimental Biology and Medicine, XII, 5.*)

Since December 8, 1913, the New York State commission on ventilation has been conducting an extended series of experiments on the physiological and psychological action of various atmospheric conditions. For most of the tests human beings have served as subjects; a few lines of observation have been carried out on animals. The rate of the heart beat and the blood pressure have been studied by the usual methods and have subsequently been evaluated accord-

ing to the Crampton, the Barach, and other indices. Bodily temperature has been measured chiefly by clinical thermometers and, at times, by the constant temperature recorder of Leeds and Northrup. This instrument consists of a self-balancing Wheatstone bridge, is sensitive to one-tenth of a degree, and makes on paper a continuous record of rectal temperature. The apparatus proved very prone to get out of order, and for this reason could not be used as constantly as was desired. Muscular work was performed by the lifting of dumb-bells to a given height, the number of lifts being recorded by a telephone counter. For more exact determinations of the amount of work performed, a Krogh bicycle ergometer was employed and proved very satisfactory.

Respiration was studied by determining its rate and the volume of air respired, the carbon dioxide tension of the alveolar air by the Haldane method, and the volume of the dead space by the method of Douglas and Haldane, while the acidity of the blood was tested by means of both the carbon dioxide tension of the alveolar air and the dissociation curve of the hemoglobin by the method of Barcroft. By the usual methods, determinations were made of the respiratory quotient, the amounts of carbohydrate and protein metabolism, the production of heat, and the specific gravity and freezing point of the urine. Some determinations of the sensitivity of the skin were made by the method devised by Martin.

Appetite was studied by measurements of the number of calories represented in the food actually eaten by each subject from standard luncheons which were served in the observation room. The amount and the quality of mental work each subject was capable of performing under the different atmospheric conditions were determined by means of a considerable variety of mental tests, such as the naming of colors and their opposites, the cancellation of given letters in a large group, the addition of numbers, mental multiplication, typewriting, the grading according to a given scale of specimens of handwriting, poetry, and English prose composition.

The action of the different atmospheric conditions upon the nasal mucous membrane was observed by means of rhinoscopic observations of the membrane, which were supplemented by the use of the Zwaardemaker plate. The significance of dust in the air in relation to infection was studied by exposing animals for stated periods to air containing dust from various sources, such as metal, hair, coal, and mother-of-pearl, and subsequently inoculating the animals with the bacilli of tuberculosis. By means of an apparatus specially devised the amount of dust in the air under different conditions has been determined. The relation of atmospheric conditions to immunity has been studied by determinations of the agglutinins in the blood.

THE EXPERIMENTAL PLANT OF THE NEW YORK STATE COMMISSION ON VENTILATION.

C. E. A. WINSLOW, M. S., College of the City of New York.

(*Proceedings of the Society for Experimental Biology and Medicine, XII, 5.*)

The physiological investigations of the last 20 years have indicated that the ordinarily observed results produced by the air of crowded unventilated rooms are due to thermal rather than chemical conditions, high room temperatures producing serious physiological derangements, while the chemical constituents of the air of such rooms appear not to exert any measurable effects. For the further study of the reactions of the body to moderately high room temperatures, and for a more exhaustive investigation of possibly undetected chemical influences, the New York State commission on ventilation has equipped an experimental plant in rooms courteously placed at its disposal by the trustees of the College of the City of New York.

Since the effects to be observed would naturally be slight, it was necessary to provide a plant on a large enough scale for the observation of a number of subjects over considerable periods of time. On the other hand, since we were dealing not with calorimeter experiments, but merely with the effects of ordinary atmospheric conditions upon the human body, it was not essential that these atmospheric conditions should be regulated within closer limits than those attainable under the best practical conditions.

The observation room of the plant is 10 feet by 14 feet and 10 feet high, and is insulated with 2 inches of cork board and a one-half inch coating of cement, with a smooth white cement finish. A skylight at the top is fitted with three sashes and the room is entered through three doors with air chambers between. The subjects may be observed from the apparatus room through a window. Air may be supplied to the observation room through one or more of four 12-inch openings in a 12 by 18 inch vertical duct, and may be exhausted from a similar duct at the other end of the same side of the room. The air flow is measured at the inlet by a meter specially designed for the purpose. For maintaining desired temperature and humidity conditions without fresh-air supply the observation room is equipped with ammonia cooling coils, steam radiators, and a humidifying pan. Desk fans are provided for securing local air circulation. Continuous records of temperature and humidity in the observation room are made by means of a Bristol recording psychrometer, and samples of air for carbon dioxide determinations are collected by continuous aspiration through a wash bottle of sulphuric acid.

The apparatus room (11½ by 14 by 11 feet) contains two 8 by 9 inch multivane fans for supply and exhaust and insulated ducts by

means of which air is drawn in from above the roof and delivered either to the observation room or the apparatus room itself. Air may also be recirculated continuously through the observation room. The volume of air may be varied between 30 and 350 cubic feet per minute. The main duct is provided with tempering and reheating coils, and with a Warren Webster air washer for humidification and a drying tank containing trays of calcium chloride. The apparatus is fitted at all essential points with automatic apparatus for temperature and humidity control. It has, however, always been found necessary to supplement the automatic regulation by manual control. The apparatus room also contains animal cages surrounded by revolving glass boxes for exposing animals to the effect of dust-laden air.

The ammonia coils in the observation room are served by a 4-ton Brunswick Refrigerating Co. compressor with appurtenances.

The plant was designed to maintain conditions varying from those existing out of doors or less up to 100° F. in zero weather, with humidities varying from the saturation point to practically nothing. With the exception of the reduction of humidity in warm weather, which the calcium chloride tank does not satisfactorily accomplish, the plant has fulfilled all our requirements. The extreme range in temperature during the day is usually 2° and very rarely over 4°; and the extreme range in relative humidity ranges between 2 and 10 per cent of saturation. The carbon dioxide remains usually below 8 parts per 10,000 when air is supplied, and when stagnant conditions are maintained it rises to between 30 and 90 parts, depending on the number of occupants in the room and the weather conditions outside which influence inevitable leakage.

ON THE ACTION OF TEMPERATURE AND HUMIDITY ON THE ORGANISM.

FREDERIC S. LEE, Ph. D., and ERNEST L. SCOTT, M. D., College of Physicians and Surgeons, Columbia University.

(Proceedings of the Society for Experimental Biology and Medicine, XII, 1.)

The main object of the present research is to discover whether objective signs of physical inefficiency may be found in individuals when subjected to an atmosphere of high temperature and high humidity. Cats were used as the subject of experimentation, and were confined individually for a period of six hours within a small chamber supplied with abundant moving air. With one group of animals the temperature averaged approximately 21° C. and the humidity approximately 54 per cent; with the other a temperature of 33° C. and a humidity of 89 per cent were employed; that is, the

animals of the first group were kept under comfortable atmospheric conditions; those of the second group were given air approximating that of a hot, humid summer day. In some of the animals the rectal temperature was observed at the beginning and the end of the period of confinement. At the end of this period the cats were taken from the chamber and killed by instantaneous decapitation. The blood was collected for the estimation of sugar, and certain of the muscles were removed and stimulated until they were exhausted, each contraction being recorded graphically and the total duration of the working period and the total amount of work performed being determined. (Tables omitted.)

Under the influence of the high temperature and the high humidity, the total amount of work which the muscles are capable of doing before exhaustion sets in is markedly diminished, and the total period of working power is shortened, except in the case of the diaphragm.

The observations show that the bodily temperature of the animals rises in the atmosphere of high temperature and high humidity.

In addition to any bearing which the content of sugar in the blood of these animals may have upon the problem in hand, the apparatus offered a means for determining whether certain extreme weather conditions would introduce a disturbing factor in experiments involving the determination of sugar in the blood. In order to avoid vitiating the results by emotional hyperglycemia, only the blood from those animals which appeared quiet during confinement in the chamber and upon removal was taken for analysis. The normal or standard percentage of sugar in the blood of cats—0.069 per cent—reported elsewhere by one of us, was determined upon animals which could be presumed to be in every way comparable with those used in these experiments except for the experimental conditions. The average found for the cats kept at the low temperature and low humidity was practically identical with the standard, while the animals kept under the adverse conditions described gave an average of only 0.060 per cent, or 87 per cent of the standard. The significance of this difference is somewhat difficult to determine; this is especially so in the absence of the coefficient of respiration. It is possible that less sugar is mobilized in response to the lessened heat requirements of the organism.

IMMODERATE SMOKING AND THE CARDIO-VASCULAR SYSTEM.

(*Editorial in Medical Record, New York, July 18, 1914.*)

There is abundant clinical evidence that excessive smoking causes certain neuroses of the heart and is a potent factor in the production of arteriosclerosis. The experimental study of the effects of nicotine

when injected into rabbits has shown that this alkaloid gives rise to the various changes of arteriosclerosis. This knowledge is not likely to deter the confirmed smoker. Nevertheless it furnishes a rational argument for the restriction of this form of indulgence.

A comprehensive study of the effects of tobacco upon the heart and blood vessels is contributed by J. Pawinski to the Zeitschrift für klinische Medizin, volume 80, Nos. 3 and 4. In studying the causes of arteriosclerosis, as revealed in 3,156 cases with a known etiology, the author found that immoderate addiction to tobacco occupied the second place, the first being obesity. A history of excessive smoking was recorded in 29.8 per cent of the cases. There were 1,075 cases in which sclerosis of the coronary arteries was the most pronounced type of the disease, and in these cases tobacco came first in importance as an etiological cause, contributing to 41.9 per cent of the cases, while obesity, alcohol, psychic manifestations, and syphilis came next in order, accounting for 26.3, 21.3, 13.3, and 10.3 per cent of the cases, respectively. In the 2,081 cases of arteriosclerosis in which the coronary arteries were not affected the figures were as follows: Obesity, 25.9; smoking, 23.3; alcohol, 23.3; syphilis, 13.3; and psychic causes, 6.1. The significant fact gleaned from these statistics is that of those patients who suffered from angina pectoris about one-half had been inveterate smokers, whereas in the cases of arteriosclerosis without angina pectoris only one-quarter of the patients had been addicted to tobacco. The above figures applied to cases in which in addition to the main etiological cause there were other associated factors. The figures were much smaller when the causes were not combined. For instance, when smoking was the only possible etiological factor it accounted for 19.4 per cent of the cases of coronary sclerosis instead of 41.9 per cent. The ratio of the simple to the combined factors was 209:248. On the other hand, in the remaining vascular territory the ratio of the tobacco factor alone to this factor combined with others was 316:370. From these data the important conclusion is drawn that tobacco has a certain, possibly a specific, affinity for the coronary arteries and may probably be compared to the psychic factor which plays an important rôle in the pathogenesis of angina pectoris. The factor which, in combination with tobacco, appears to be most frequent in the etiology of arteriosclerosis is alcohol, and this is particularly the case when this condition is generalized.

Nicotine is a powerful poison, which approaches cyanogen very closely in its virulence. The fatal dose for human beings has not been determined, but doses as small as 0.001 to 0.003 gram cause serious symptoms of poisoning. In addition to nicotine, tobacco leaves contain a nitrogenous substance, nicozyanine, related to camphor, and resembling nicotine very closely in its action. In addition these leaves contain volatile oils, nitrogenous substances, fat, organic

acids, starch, sugar, pectin, and cellulose. The much-disputed question whether tobacco smoke contains nicotine has been decided in the affirmative by the investigations of Zulinski and Zebrowski. Tobacco smoke contains, in addition, two other bases belonging to the pyridin groups, namely, pyridin and collidin. Pyridin is formed chiefly if the tobacco is smoked in a pipe and irritates the mucous membranes; collidin is formed chiefly when the tobacco is smoked in cigarettes and has a milder action.

Claude Bernard was the first to prove that nicotine is a poison to the vagus nerve. Traube showed that nicotine has an action closely allied to that of digitalis, both substances exciting the neuromotor apparatus of the heart. Recent investigations have shown that nicotine has a pronounced action upon the muscle fibers of the heart. Besides, it has a marked action upon the blood vessels, causing a considerable rise in the blood pressure. This is the result of a stimulation of the vasomotor center in the medulla oblongata and the vasomotor apparatus in the wall of the blood vessels. The vessels chiefly of the lower extremities and of the abdominal cavity are contracted, but the cerebral vessels are dilated. Following a period of increased blood pressure there is a reduction of the pressure below the normal.

Langley and Anderson have shown that nicotine is a potent poison for the cells of the entire vegetative nervous system, including both its sympathetic and its autonomous divisions. In this respect nicotine is unlike other exogenous poisons, whose specific action is more restricted. For instance, suprarenal extract exerts its influence only upon the endings of the sympathetic nerves, while atropine and muscarine act only upon the peripheral ends of the autonomous nerves. Pezzi and Clerc studied the action of nicotine upon cardiac rhythm and attributed the irregularities in the latter induced by this alkaloid to its excitation of the vagus center. In this connection the experiments performed by Otto on rabbits are of eminent clinical significance. He found that the most marked changes occur in the coronary arteries and its branches, and consist in a considerable thickening of the intima and in a pronounced degeneration of the media. Besides, the heart muscle undergoes parenchymatous and interstitial changes. The investigations of Adler and Hensel, of New York, must not be forgotten, for these observers succeeded in producing atheromatous changes in the aorta by means of intravenous injections of nicotine.

The functional disturbances of cardiac activity which are attributed to the effect of nicotine are similar to those that result from other causes, such as brain fag, neurasthenia, hysteria, etc., with this difference, in the former the disturbances of rhythm are particularly the occurrence of intermissions caused by extrasystoles. In men these disturbances occur after about 10 or more years of indulgence in

smoking. A persistent irregularity is more rarely observed occurring particularly in habitual cigar smokers who also eat and drink to excess, and in obese individuals. The sensory neuroses of the heart resulting from tobacco are more common in women than in men. Precordial anxiety and bradycardia occur only in those who smoke greatly to excess, and paroxysmal tachycardia occurs in those who inherit an unstable nervous system. Attacks of false angina pectoris are also attributed by the author to immoderate smoking. The sclerosis of the vessels of the lower extremity is another sequence of this habit. It gives rise to intermittent claudication, which in certain respects is regarded as a peripheral form of angina pectoris. The so-called angina abdominis is likewise attributed to the same cause.

ANTISPITTING SIGNS AND THE CONTROL OF EXPECTORATION.

ADOLPH GEHRMANN, M. D., Chicago.

(*Illinois Medical Journal, February, 1915.*)

Laying aside all that pertains to disease by direct transmission of bacteria through the medium of mucus from the respiratory passages—the possibilities of which we recognize—the spitting nuisance is a subject for urgent sanitary consideration.

* * * * * * *

The control of the expectoration nuisance can be undertaken along several lines of activity in the work of a health department: (1) by education; (2) by compulsory activity, arrests, etc.; (3) by offering convenience to care for the function; (4) by persuasive means, as the antispitting crusade; (5) by keeping public places in such good order that cleanliness will be the determining factor; (6) the influence of popular habits, as gum chewing and like practices.

Education.—The educational campaign against expectoration must be with the children. It is useless with adults. Dr. Knopf, in the international prize essay, has recommended a leaflet called the alphabet, in which each letter represents some fact in the antituberculosis campaign, and covers the care of mouth and nose mucus. The end of the use of slates, sponges, and drinking cups and the general instruction that objects must not be put in the mouth go a long way toward gaining an attitude of mind to develop decency in regard to spitting. Where the authority is sufficiently respected the spitting nuisance can be stopped at once. This was done at the slaughterhouses in the Chicago stock yards after the "muck-rake" investigation in 1906. It was there made a rule not to spit except into cuspidors, and the rule was enforced. We all know that medical colleges especially were in an awful condition because of the bad practice of students. In the College of Medicine of the University of Illinois

the usual conditions as to smoking and spitting pertained until President James issued an order forbidding the same, and at once the conditions changed, because the students recognized the authority of the regulation. Such rules can be made effective in schools, shops, or business places where we are dealing with the same groups of people, but the general public is hard to handle and can not be regulated in so easy a manner.

Compulsion.—Generally compulsion by arrest, fines, and threats under ordinance regulations has been a failure. The difficulty is that, in the first place, people pay little attention to such laws; secondly, it is very difficult to secure evidence, and then only the worst offenders are captured; thirdly, it is difficult to prove in court that an injury has been done; fourthly, it is an expensive and annoying method to accomplish the purpose.

Conveniences.—If sanitation purposes to offer protection against sputum as a factor in the spread of disease, it must plan out some method of disposal. The ultimate aim of sanitation should be to prevent untreated sputum from getting away. It should go with sewage. We should try to get it deposited in drains, and here its disposal is as a part of other excrement disposition. The ordinary cuspidor is at the present time an apparent necessary nuisance. The time will come when it will be abolished. This is necessary because of its free exposure and the dangers that accompany cleaning. Places to spit: The gutter outdoors is an almost universal cuspidor, while indoors stationary flushing cuspidors are to be recommended, and if movable they should be provided with lids. All toilets are cuspidors, a fact little thought of by people in general. The cuspidor that is often placed in a toilet is in itself a menace by attracting flies and often making the place unbearable.

Persuasion.—"Join the antispitting crusade." Many people have good intentions, but they do not follow the principle when alone and free. It takes a special mental attitude to follow a precept through a day's activity and live up to what we may know to be right. The antispitting crusade is a good, popular way of stating the subject, and in time will have many adherents. However, it only reaches a small class of wide-awake people and is passed unnoticed by the masses. Such a crusade is also spasmodic and exerts a good influence only over short periods. As in all crusades, it is the novelty of the situation and idea that makes it go. If a crusade is undertaken, it should be on a wide scale, so as to reach all classes and places in the community. It is almost impossible to find the last place where an improvement can not be introduced for sputum disposal. It is not always easy to spit straight, even with good intention. All the different restrictive and preventive measures, as care of the fingers, mouth, and nose, proper use of handkerchiefs, when and where to

spit, and the danger of disease dissemination may be fully covered to advantage in such a campaign.

Cleanliness.—A man does not like to spit on a clean floor. If it is dirty, he will spit at once. If it is clean, he usually goes over and spits on the wall. No better example of a changed condition can be found than the difference between the old North Western Railway station in Chicago and the new station. The new station is so clean that one hates to make it dirty, and it remains clean.

Habits.—The reduction of the extent to which chewing tobacco is used is having an influence on expectoration. There is a widespread substitution of chewing gum for tobacco. To chew something is a general characteristic of mankind. In every country or clime some form of chewing is practiced. In some, nuts or berries are chewed and the hulls or seeds spit about. The use of gum is in many ways a sanitary improvement. It is cleanly and there is less tendency to spit while chewing gum.

As more infections begin by an invasion through the mucous membrane of the mouth and nose than by any other atrium, the public should be instructed as to the dangers from sputum and the means of disposing of it. Our publicity campaign can not go too far, because spitting is so frequent and promiscuous that attention must almost be continuously directed against it. Facilities should be provided and the people should be instructed to use them. The wording of signs ranges from a simple command not to spit to elaborate instructions and extracts from the laws and ordinances, and sometimes the amount of the fines that may be imposed. Generally these signs can be greatly improved by making them instructive rather than forbidding signs. Usually the public is looking for help. It is suggested that a printed card be handed to offenders. People generally take offense when asked not to spit, and even purposely break the rules from a general feeling that it is an interference with personal liberty. Again, others are too lazy to exert themselves in making proper disposal. The bad habit of spitting into a corner is even the result of signs, because some people like to hide their misdemeanor. Generally a sign makes an impression, whether it is obeyed or not. The display of signs can go as far as is done in Milwaukee, where every telephone pole has a sign forbidding spitting on the sidewalks. The signs there are of metal, like advertising signs. The signs displayed in cars, railway coaches, and buses do very little good, because the passengers are often obliged to keep their seats, and therefore spit in the corner because they can not get out. It is well-nigh impossible to prevent this. To achieve perfect sputum disposal a sentiment must be developed, means for proper spitting provided, and some of our apparently fixed customs altered.

INDEX.

BULLETIN OF THE BUREAU OF EDUCATION.

[NOTE.—With the exceptions indicated, the documents named below will be sent free of charge upon application to the Commissioner of Education, Washington, D. C. Those marked with an asterisk (*) are no longer available for free distribution, but may be had of the Superintendent of Documents, Government Printing Office, Washington, D. C., upon payment of the price stated. Remittances should be made in coin, currency, or money order. Stamps are not accepted. Numbers omitted are out of print.]

1906.

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1908.

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1911.

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1914.

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