

but to a set of the cells of the posterior horn, which has the power of bringing in muscles one after another, according to the amount of stimulation sent down; but any combination of movements would necessarily take place in the cortex to start with. It would otherwise be necessary to send down a vast multitude of fibers; you would want to send down a fiber to the flexors of the finger, and another to the extensors to the wrist and to the fixation muscles; if you consider the various combinations, a pyramidal tract and internal capsule of immense size would really be necessary. The captain sends down one message, "Go ahead;" he does not tell the engineer how much steam power to use, nor does he attend to any of the details; and all the details are attended to in the engine-room and elsewhere.

Of course I have not taken the cerebellum into account, because I have only taken a single muscle and not a combination. The cerebellum is the center where movements of balance take place, but you can not balance with only one muscle.

I do not know anything about the corpus striatum. As to whether it is excitable or not, people differ. In some work I did with Victor Horsley some years ago, we stimulated the corpus striatum with negative results. We found that if we got near to the internal capsule we got movements, and the movements were precisely the same as we got from the internal capsule only less in degree, and weaker and weaker the further from the internal capsule we got.

Therefore we concluded that there is no evidence that the corpus is excitable, and the result was really due to the stimulation of the internal capsule. Dr. Prince and I agree that it may be a question of memory. I agree also that want of inhibition is the great point in hysteria.

At a meeting in Berne I saw a dog without any cerebrum running about, but that can not occur with a monkey. Goltz used a dog and Fourier used a monkey, and of course they could not agree. I think the monkey is nearer to man than he is to the dog. I think that want of control not suggestion is concerned with hysteria. The movements of the frog trying to rub off an irritating substance is a matter of the co-ordination of several muscles—a matter which I have not been considering.

I studied a number of newborn children to see whether in the youngest child coordination took place—that is, whether when the child grasps, the hand goes round or not, and I think in about half the cases the arm muscle went around, and in the other half it did not. Dr. Robinson showed years ago that you can hang up a newborn child by the hands and it will hold on to a rail.

I once thought that coordination of muscular movement takes place in the anterior horns, but I have come to the conclusion that probably it takes place in the posterior horns.

In regard to chorea I have not induced the antagonist to act in the same way. But there again it is a question of combined movements and not one single movement. No doubt the patient performs the wrong movement, but it is a wrong movement as a rule, and not an antagonistic movement.

I have observed that the muscles in front of the leg contract in ankle clonus, as Dr. Church observes.

Serum Sickness from Antitoxin Treatment of Tetanus.—

Savariaud reports in the *Tribune Médicale*, June 13, the case of a girl of 8 who scraped her knee in falling on the gravel and three days later began to limp and was brought to him. Besides rest and simple local measures he advised an injection of antitetanus serum, assuring the family that it was absolutely harmless. Five days after a second injection, at the tenth day, severe pains developed in the joints and the child could scarcely move her neck and limbs, while especially on the forearms and in the inguinal and axillary regions erythematous patches suggested an eruptive disease. The eruption subsided in fifteen hours, but fever persisted for six days and the pains in the joints for four or five. He cites a few cases of similar disturbances from serum treatment, observed in France, remarking that these accidents are neither frequent nor serious, but that their possibility must be borne in mind.

Original Articles

INSANITIES CAUSED BY ACUTE AND CHRONIC INTOXICATIONS WITH OPIUM AND COCAIN.

A STUDY OF 171 CASES. SUGGESTIONS FOR LEGISLATIVE AND OTHER MEASURES. THE QUESTION OF RESPONSIBILITY.*

ALFRED GORDON, M.D.

Associate in Nervous and Mental Diseases, Jefferson Medical College;
Neurologist to Mount Sinai Hospital, Douglass Memorial
Hospital and Northwestern General Hospital.

PHILADELPHIA.

During the last seven years I have been collecting cases of intoxication with morphin and cocain. The majority are cases observed in hospitals. Confining myself to the effect of the drugs on the cerebral functions, and especially on the mentality, I am able to divide the 171 cases into two groups, viz.: 80 of acute and 91 of chronic poisoning. The first group comprises 60 cases of morphin, 15 of cocain and 5 of mixed intoxication. The second group is composed of 70 morphin habitués, 10 cocain habitués and 11 patients with mixed intoxication.

The permanent effect of the poison did not depend altogether on the mode of its administration or amount absorbed. For a normal adult 6 or 7 cgm. hypodermically constitute a toxic dose, but individual susceptibility should be taken into consideration. Cases of recovery have been reported even with doses of 75 cgm. of morphin.

Habit is very rapidly established.

FIRST GROUP.—A. ACUTE INTOXICATION WITH OPIUM OR MORPHIN (SIXTY CASES).

In this category are placed patients who showed signs of intoxication even after one dose of the drug. When the dose is not immediately fatal, there is at first some agitation without delirium. The patient is loquacious. The mental faculties are stimulated. There is a feeling of beatitude, of euphoria. Soon heaviness of the head and vertigo make their appearance. The latter is followed by somnolence. The general sensations and special sensorium become obtunded, the patient enters into a profound sleep during which death may ensue. In grave cases the respiration is slow, viz., five or six respiratory movements a minute. The pulse is small, irregular; the face is congested, the temperature is lowered. Urine decreases in quantity. Convulsions occur during the last period. In five cases somnolence was absent and the agitation of the first period persisted and was accompanied by a delirium with terrifying hallucinations of sight and hearing.

In seven cases the terminal coma gradually disappeared. The patients regained consciousness and apparently recovered, when at the end of 12, 24 and 36 hours a new attack of coma supervened with rapid death. It is probable that a new absorption of the poison occurred which during a number of hours remained inactive in some portion of the digestive tract.

Recovery may follow even after long hours of coma. During convalescence are observed vertigo, mental hebetude, temporary aphasia or blindness, and many

* Read in the Section on Nervous and Mental Diseases of the American Medical Association, at the Fifty-ninth Annual Session, held at Chicago, June, 1908.

other physical manifestations, including such as constipation, vomiting, retention of urine, albuminuria and myosis.

Fifty-two patients in my series of acute intoxication recovered. Thirty-five presented for weeks mental disturbances deserving special attention. They showed slowness of thought and difficulty of grasping complicated subjects. Questions had to be repeated a number of times before they could comprehend them. There was striking mental fatigue. All these patients were particularly annoyed by dreams, which in the majority of cases were of a pleasant nature.

These thirty-five patients used about the same amount of opium or morphin as the seventeen who did not present prolonged mental disturbances. Some of them had only one dose, others two or three doses, and still others a daily dose for a week. There was no direct relation between the amount taken and the symptoms. For example, some of the thirty-five patients who presented prolonged mental disturbances used a smaller amount of morphin than those who recovered promptly. The question is, therefore, one of individual susceptibility. Nevertheless, it is well to remember that even one large dose is likely to disturb the mental functions for a period of several weeks.

FIRST GROUP.—B. ACUTE COCAIN INTOXICATION (FIFTEEN CASES).

As soon as cocain enters the general circulation it acts on the brain and spinal cord.

Precordial pain, rapid and filiform pulse, lividity of the face, cold extremities, cold perspiration, Cheyne-Stokes respiration and anuria are the immediate symptoms. The mental manifestations in nine of my cases were mainly excitation, restlessness, loquacity, crying or anger.

In six cases there was a state of depression and a semistuporous condition, accompanied by nausea, tachycardia, mydriasis and abundant perspiration. In all there was a certain degree of vertigo with ataxia in gait and peculiar hallucinations. The latter were visual and tactile. The visual consisted of black insects and rats. The tactile hallucinations were a tingling, pinching and the sense of holding imaginable objects in the hands.

Four of my patients had generalized convulsive seizures without a previous history of epilepsy. The seizures were followed by a semicomatose state, lasting from one to three days.

Nine patients recovered completely. Two died at the end of twenty-four hours and four days, respectively. The first swallowed, with suicidal intent, eight grains of cocain. His cerebral symptoms were stupor and hallucinations. He died in syncope. The other patient, also suicidal, lived four days with symptoms of extreme agitation, delirium and hallucinations. He died from exhaustion.

The four patients who presented epileptiform attacks, although they eventually recovered, nevertheless for six subsequent weeks suffered from insomnia, anorexia, diarrhea, vertigo and attacks of delirium. One was unable to resume his occupation of office clerk for six months; his memory was deficient and he could not solve the simplest mathematical problems without making mistakes. His intoxication followed two injections of cocain into the gum for some alveolar operation. The dose could not be determined.

FIRST GROUP.—C. ACUTE MIXED INTOXICATION (FIVE CASES).

The intoxication followed external application of cocain (snuff) and internal administration of laudanum (two cases), also a hypodermic injection of morphin (one case) (for relief of an attack of *tic douloureux*), together with an external application of 10 per cent. cocain to the cheek, which had erosions. Two medical students, suffering from a severe coryza, used a 15 per cent. cocain solution as a spray and $\frac{1}{2}$ grain of morphin internally.

The most prominent symptoms in all five cases was a very marked stuporous state with paroxysms of delirium and visual hallucinations. The tactile hallucinations characteristic of cocain intoxication were absent. Myosis, constipation, anuria, coldness of the extremities and difficult respiration were also present.

When the acute symptoms disappeared, a mental dullness, apathy, remained for two weeks in one case and for seven weeks in four cases. Eventually all the patients recovered.

SECOND GROUP.—A. CHRONIC INTOXICATION WITH MORPHIN AND OPIUM (SEVENTY CASES).

In considering the manifestations of morphinism I made a comparative study of cases of months' and years' duration.

Twenty cases ranged between two and eight months, and fifty cases between two and twenty-two years of chronic intoxication.

The majority of the patients used morphin; some, however, took opium. Among the latter I had eleven men, of whom six took internally and five smoked opium, with five women who smoked opium and six women who drank laudanum daily.

Morphin was used mostly hypodermically, but in some cases also by the mouth. The amount varied from eight grains to fifty grains of morphin, internally or hypodermically, or from three to twelve drams of laudanum. The amount of smoked opium could not be determined.

The effect of morphinism is somewhat different from abstention from morphin or opium. I had the opportunity to study twenty-six cases during the period of abstention. Speaking generally, the ultimate effect of chronic abuse of opium and morphin is practically the same.

The twenty cases in which the intoxication lasted only months and the fifty cases in which the intoxication lasted years presented but slight differences. In the main, the symptoms were identical.

Description.—With each new administration of opium or morphin there is at first a muscular weakness, languor, an imperative necessity for rest; the pulse is diminished in frequency, and the respiration becomes somewhat difficult. Soon, however, the condition changes. A cerebral excitation takes place, the intellectual functions become exalted. In the intervals between individual doses, such patients exhibit the following important symptoms: Intelligence is lowered. Memory is decidedly impaired. The mental energy is weakened. The aptitude for work is lessened. There is a sort of apathy in the patient's thoughts and acts. The moral sense suffers profoundly. The patient loses the sense of obligation to his family, he loses affection for his children, becomes egotistic. His will power is decidedly deficient. One of the patients, a married woman,

frequented a disreputable house, not for sexual reasons, but for the purpose of procuring money for morphin. Another woman became a kleptomaniac for the same reason. Not infrequently these individuals commit excesses of all sorts and even crimes. Deception and lies are common. These general symptoms were present in ten cases. In the remaining sixty there were special mental manifestations characteristic of certain psychoses.

Melancholia: The morbid phenomena of melancholia were observed in eight cases. Here the depression with a tendency to suicide was very marked. However, there were also incoherence, some confusion and a mild degree of dementia. The latter symptoms are not characteristic of typical melancholia. It is true that they are found in the period of terminal dementia, but then the suicidal tendency is usually absent.

Mania: Maniacal agitation with apparent lucidity, alternating with periods of depression, was observed in nine cases. Again the condition simulated the manic depressive form of insanity, but the evolution of the symptoms was not characteristic of it.

Delusions: Systematized delusions of a persecutory nature were noticed in only five cases.

Unclassifiable Symptoms: The remaining thirty-eight cases presented symptoms of an unclassifiable nature. Some of them would reveal delusions of an unsystematized nature, fragmentary, fleeting, changing from day to day, from one examination to another. They were mostly of a persecutory type; some of them presented the expansive form. Delusions of erotic nature figured in many cases. Hypochondriacal delusive ideas were absent. Hallucinations were auditory or visual, more of the latter than of the former. Incoherence and confusion were present in all the cases.

Dementia: This was the prominent feature, especially in cases that were free from delusions and hallucinations. There was a childishness in actions and words and demeanor. The general attitude and appearance were those of dementia due to other causes. To illustrate, the patient smiles and laughs without cause or on the least provocation. When spoken to, he looks up astonished; if an answer follows, it has either no relation to the questions asked or it will be considerably delayed. In some cases the patients are extremely talkative and one question is sufficient to start a conversation which does not cease unless you interrupt it. Two patients of my series in very advanced periods of their morphinism (10 and 14 years of continuous use) could talk at least for a half an hour without pausing. The sentences they used had no connection with one another. The dementia in the majority of my cases was mild, especially in those with the unsystematized delusions and hallucinations, but was marked in cases in which the latter were absent.

Physical Signs: The psychic disorder is usually accompanied by physical signs of chronic poisoning, viz.: muscular asthenia, tremor, anesthesia or hyperesthesia, obstinate constipation, impotence, disturbance of micturition, diminution of salivary, sebaceous, gastric, menstrual and spermatoc secretions but increase of perspiration, loss of reflexes and, finally, an especial facies. The last appears to be old and wrinkled.

SECOND GROUP.—B. CHRONIC INTOXICATION WITH COCAIN (TEN CASES).

In six of these cases the habit was acquired while under treatment for nasal affections. They used the

drug for from three to eight years. Four patients used cocain for a period of from six to ten years. They acquired the pernicious habit by being advised to use at first the snuff and later internally to get relief from migraine and gastralgia.

Psychic Disturbances.—Besides the physical signs, such as tachycardia, pallor of the face and impotence, the patients presented interesting psychic disturbances. Insomnia was a constant symptom in my cases. In such patients there is restlessness and craving for muscular and intellectual activity. The hallucinations seen in acute poisoning are still more marked in the chronic form. They affect the general sensibility, also sight, hearing and touch. The patient feels that the skin is filled with insects, microbes, crystals of cocain. Sometimes he feels electric shocks, cramps or shooting pains. He sees animals, human beings, shadows, colors, change in the size of objects. He hears voices, sounds, noises. When the muscular sense is altered, the patient feels that he is lifted up in space, carried and abandoned. The hallucinations lead to the formation of delusive ideas which are mostly of a persecutory nature. Systematization of these ideas is very rare (one case); they are mostly unsystematized and vague. Alongside of hallucinations and delusions, there is a gradual and progressive decrease of intellectual force and moral sense. The patient becomes indifferent. His instinct predominates. He is filthy. Dementia is the final outcome.

SECOND GROUP.—C. CHRONIC MIXED INTOXICATION (ELEVEN CASES).

All my eleven cases acquired the habit at first in attempts of substituting cocain for morphin and later by using both drugs simultaneously. Morphin was used hypodermically and cocain by the mouth.

The special hallucinatory images mentioned above in connection with cocainism are all present here, in addition to insomnia and delusive ideas, but what characterizes the mixed intoxications is the more rapid development of the intellectual and moral reduction. The dementia appears early when compared with the date of its appearance in isolated intoxications. In one of the eleven cases the patient, a young physician, presented during a period of four years a systematized persecutory delusion concerning his mother and two brothers who conspired against him. Later he included another physician and myself in his delusive idea. The latter was intensified by terrifying hallucinations. He attempted to kill his mother on two occasions. The previous history of the patient did not warrant the diagnosis of paranoia. However, the paranoid delusion rendered him dangerous. He had to be confined in an asylum. There he was entirely deprived of cocain and morphin and he gradually recovered. Six months later he resumed his old habit and again the same persecutory delusion made its appearance. Again he was committed. A sojourn of four months in an asylum removed all the symptoms. At present he is showing evidences of mild dementia, although there is no return to the drugs.

MORBID MANIFESTATIONS OF ABSTENTION.

Several (26) of the morphin and a few (5) of the cocain habitués were kept under observation, while the drugs were entirely and suddenly withdrawn. The following symptoms could be noticed: Both categories of

patients presented a picture of extreme suffering; they were restless, full of anxiety, agitated and incapable of listening to others, following a conversation, of reasoning or of reflecting. Delirium and hallucinations were present in some cases, especially in those of mixed intoxication. Some patients would be taken suddenly with chills, accompanied by twitchings. Others showed a tendency to faint. Insomnia was common and persistent. A few of the morphin habitués had morbid impulses. They would suddenly jump out of bed and attack their nurses and relatives or throw objects at them. The cocain habitués continued having the tactile hallucinations, but to a lesser degree than when the drug was used.

The delusional ideas diminished in intensity, but those who presented signs of dementia did not show any improvement in the mental condition. Besides, the physical condition in the majority of the patients became so alarming that occasionally a return to the drugs was absolutely necessary.

In cases of gradual withdrawal there are symptoms of general malaise, of anxiety, of depression. Photophobia and hyperacusis are present; loss of appetite, diarrhea and neuralgia are frequent.

CONCLUSIONS FROM THESE OBSERVATIONS.

A careful analysis of the cases shows that if an attempt is made to find in acute or chronic morphinism and cocainism any of the well-known forms of psychosis, a total failure follows. Some cases may simulate melancholia, mania, manic-depressive insanity and even paranoia, but in none of them can be found the typical pictures of these psychoses.

Outside of the special tactile hallucinations of cocainism, we find in the acute form sometimes a delirious or a stuporous state. An element of confusion always accompanies them. Hallucinations of sight and hearing are frequently present.

In the chronic form, the most important part of the present study, the part which gives us the most concern, we do not find any of the above-mentioned psychoses in their typical forms, but we do find vague manifestations, as delusions of a transient, fleeting and fragmentary character. It is true that at certain periods of their evolution the latter assume the form of systematized ideas and conceptions, reinforced by hallucinatory images, and thus may present a picture of paranoia or other forms of insanity, but the *ensemble* of the condition does not permit us to consider them as such.

A characteristic symptom is the gradually oncoming dementia, which develops very insidiously in the inveterate habitués and increases with years until a complete psychic decrepitude is established. It is this threatening progressive quantitative diminution of mental power that presents the alarming problem for us when we are called on to counsel and render assistance to the community.

When we compare intoxications from other sources with that of our present study we do not find any essential difference. Each agent may add a new special symptom, as, for example, the tactile hallucinations of cocainism, but the fundamental clinical picture in all remains invariably identical. In the acute forms there is a confusion of all sorts of mobile and contradictory conceptions, a dissociation of all elements of normal psychic life. Hebetude, stupor and amnesia follow. These manifestations may be accompanied by halluci-

natory images and sometimes superimposed by incidental delirious states. Not infrequently is observed the "*rêve onirique*" on which Régis lays so much stress. That is to say, a dreamy state which is the continuation of dreams occurring during the night. The images seen by the patient in his dreams are confused with the impressions of real life and thus increase the contradiction of conceptions.

In the chronic form all varieties of intoxications invariably lead to the gradual enfeeblement of mentality, viz., dementia.

SUGGESTIONS FOR LEGISLATIVE AND OTHER MEASURES.

The disastrous effect of chronic absorption of morphin and cocain is well known not only to physicians, but also to the laity. The physical and intellectual disintegration to which the pernicious habit leads is a menace to society. The unfortunate characteristic feature of the condition is that when morphin or cocain have been taken for a certain time, they become an imperative necessity to the organism, inasmuch as when being withdrawn the function of each organ is disturbed. The patient seeks then instinctively to supply the want by repeating the initial dose, at first only in small amounts, but later in larger doses. When the habit is established, it is by far more difficult to overcome than that of alcohol. De Quincey, in his "Confessions," states that he used opium for fifty-two years. Four times he attempted to give it up, but only for a short while. Finally he broke himself off forever. "I triumphed," he says, "but infer not, reader, from this word triumphed a condition of joy; think of me as one, even when four months had passed, still agitated, writhing, throbbing, palpitating, shattered."

We can not ignore the fact that while morphinomania or cocainomania used to be known mainly among physicians (according to Lacassagne's statistics over 50 per cent.) and persons coming in contact with drugs by virtue of their occupations, are now spreading to all classes of society. Daily reports of newspapers and statistics prove conclusively the truth of this observation.

In attempting to remedy the growing menace, it should be borne in mind that morphin is a precious remedy in certain incurable affections (cancer, for example), accompanied by atrocious and intolerable pain. In such cases the patient must be supplied with the drug *ad libitum*.

The struggle, therefore, will be confined to those cases in which the passion for morphin or cocain is acquired outside of painful conditions. In such cases, as is well known, the craving and longing for the drugs develop only after a more or less prolonged period of use. Interference at the proper time, therefore, may be of great utility in the majority of cases.

As prophylaxis is the most efficient measure, some legislative acts rigidly enforced will prevent at least the extraordinary propagation of one of the most pernicious habits—which eventually leads to physical and especially mental decrepitude as depicted in the histories of my cases.

In my judgment, no pharmacist or chemical house should dispense the drugs to any person without a physician's prescription. The latter must be written plainly and the order given only once. When a renewal of the drug is necessary, another prescription must be given by the physician. Of course, no attempt should be made by legislature to limit the prescribing physician

to a certain dose of the drug or to a certain number of renewals, as it may interfere with the administration of the drugs in cases in which human suffering is intense. This matter should be left entirely to the physician's moral responsibility.

Heavy penalty with imprisonment should be imposed on those who will sell or give away the drugs without regular prescriptions. Heavy penalty with imprisonment should be imposed on those who will forge a physician's prescription.

Besides a legislative prophylaxis there is a medical prophylaxis. Morphinism usually occurs in individuals with a special make-up of their nervous system. Such persons present deficiency of the intellectual and moral faculties. In them the deficient inhibitory power becomes an easy prey for all abnormal tendencies, particularly for morphinism or cocaineism. The latter are the result of a neuropathic constitution, the fruit of hereditary tendencies.

In handling such individuals, one should remember Ball's dictum, to wit: "Morphinomania is entered by the door of pain, of sexual passion, of sorrow, also by the door of contagion, viz., imitation."

THE QUESTION OF RESPONSIBILITY.

We have seen above what order of mental disturbances are present in acute and chronic intoxication.

In the *acute* form, mental excitement, delirium and hallucinations with incoherence are the usual psychic manifestations. They resemble, therefore, the symptoms of acute alcoholic intoxication. When a criminal act is committed by an individual who is in a delirious state and has hallucinations, who is then incapable of distinguishing between right and wrong, whose cerebral functions are then in a state of dissociation, such an individual can not be considered responsible for his acts from a medical standpoint.

When the patient is only in a state of mild agitation, without a delirious or hallucinatory state, or in a mildly stuporous condition, the responsibility is complete. Partial responsibility should be admitted when the patient has recovered from the immediate effects of acute intoxication, but remains for weeks, as we have seen in some of my cases, mentally dull, apathetic, with lack of sustained attention and difficulty of comprehension.

In the *chronic* form of morphinism and cocaineism the impairment or disappearance of the moral sense, deficiency of the will power and even a mild diminution of intellectual faculties do not entirely exempt a morphin habitué from responsibility; the latter is only partial. When delusive ideas or hallucinations are present, the irresponsibility is total.

When the patient reaches the stage of dementia, even in the absence of delusions, he can not be held responsible for any of his acts.

Sweat Secretion in High Altitudes.—H. Sewall, in *Colorado Medicine*, states that the technical difficulties in the way of determining the relation of altitude to secretion of perspiration are very great. It is commonly stated by those who guess at facts that the circulation in the skin and the activity of the sweat glands increase with the elevation above sea level. Mosso found, on the contrary, that a resting man loses weight more slowly from the skin on the mountains than at sea level. Zuntz found that exercise at a moderately high elevation—1,740 feet—produced more abundant sweating than in Berlin.

REMARKS ON THE FEEDING OF THE HEALTHY INFANT.

JOSEPH BRENNEMANN, M.D.

Assistant Professor of Clinical Pediatrics, Northwestern University
Medical School.
CHICAGO.

During the last decade the problem of infant feeding has been a peculiarly interesting one in this country. While European writers are fairly well agreed on fundamental methods, there has grown up a system of infant feeding in this country that in its elaboration is unique. This so-called percentage, or American, system has received such universal and unqualified approval among our pediatricians that it seems almost like heresy to doubt its tenets, and yet an overwhelming mass of evidence has appeared in the last few years that to my mind discredits the fundamental principles of that system.

I shall first outline what I believe to be a rational dietary for the first year of life and will then advance briefly some objections to the percentage method. It is important at the start to define the term "healthy" baby, because there is an essential difference between a healthy and a sick baby in its reaction to food. This difference centers in one fact—a normal, healthy infant has a broad tolerance for widely different food mixtures and for varying amounts and strengths of the different food elements, fats, proteids and carbohydrates. On the other hand, a baby that is congenitally below par, or that has been damaged by unwise feeding, or that has a temporary nutritional or digestive disturbance due to some intercurrent infection such as pneumonia, has a narrow range of tolerance for food. The sick baby requires careful dosage of food both as to quantity and composition. The moment a healthy baby is upset it is no longer a healthy baby but a sick one and must be treated as such. A food of a certain quantity and composition that yesterday was adapted to a healthy infant to-day may act as so much poison to the same baby that in the meantime has had an acute digestive or nutritional or constitutional disturbance.

THE QUESTION OF ARTIFICIAL FEEDING.

The most serious question that confronts the physician in the feeding of healthy infants is what to feed a new-born baby that is unable to get mother's milk. Budin, who was second to none in the value of his experience in infant feeding, says: "We, ourselves, and we say it in all sincerity, can not as yet indicate from our personal experience what is the best method of procedure in artificial feeding from the start." In practice he answered the question by making sure that nearly every baby in his care had mother's milk for a time. The value of the latter, even if used only for a short time, can hardly be overestimated.

Practically, it will be found that the great majority of new-born babies will bear well after the second day of life—and no baby should be fed artificially before that time—a dilution of one part of milk with two parts of water, with the addition of a small amount of milk sugar, say one-quarter to one-half an ounce in the twenty-four hours' food. This dilution can be strengthened gradually till the baby takes equal parts of milk and water with one-half to one ounce of milk sugar daily during the second and third months. The proportion of milk is gradually increased, that of water and sugar diminished till toward the end of the first year the child is on whole milk. The total twenty-four hours' food should