

variety, but even this is in most cases unnecessary—and more than this these foods do not accomplish.

So-called beef extracts and the like I need not touch on further than to point out that, as was shown in a recent bulletin of the Department of Agriculture, most of them have scarcely any food-value. Many of them are essentially devoid of all food-value and practically all are not "beef extracts" or "meat juice" at all. These, more than the other proprietary foods even, have been used with an enormously exaggerated idea of their value, and have done a corresponding amount of harm.

Some manufacturers of these and of the other preparations mentioned evidently believe the statements that they put forth in advertisements. Others quite as clearly know better, but make the statements purely to acquire money. It is a sad commentary on the knowledge of dietetics possessed by many members of our profession that they have so freely accepted these statements and then, with their minds fixed in favor of some of these substances, believe that they have seen clinical results that are absolutely impossible. When one attempts to point out to them facts that are as simple as that two and two make four and not forty, one often meets with the reply, quoted from the exploiters, that because of the peculiar manner of preparation or some peculiar composition or what not of the foods, they are especially nutritious and not to be judged by ordinary standards. This is a mere play on either ignorance or unscientific fancy. There is no basis at all for such statements in many instances; and while at most the manner of preparation and the like may give them a very small fraction of superiority over an equal amount of unprepared food, it is only a small fraction. On the basis of this very slight advantage, it is claimed usually that they have anywhere from two to a thousand times their nutritive value; sometimes even more than a thousand—an infinite number, indeed, for some of them are, so far as we know, devoid of any nutritive value. And yet some of the latter have been used quite as freely as some that have value, simply because they have been well advertised.

1432 Pine Street.

PROPRIETARY AND PREDIGESTED FOODS FROM THE STANDPOINT OF THE PEDIATRIST *

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The name of the proprietary infants' foods is legion. They are like the rats in Bishop Hatto's tower; "by thousands they come and by myriads and more." No one can remember the names of more than a fraction of them. Many are widely used throughout the civilized world; others have merely a local vogue. We may well seek an answer to the question, What has brought about the general employment of these substances?

Undoubtedly many factors have been operative. One of the chief of these has been the ignorance of the great bulk of the medical profession in regard to the artificial feeding of infants. It was for years and by many considered as a subject little deserving of the serious attention of a trained physician, and the amount of exact knowledge, until comparatively recent years, was pitifully small.

* Read in the Section on Pharmacology and Therapeutics of the American Medical Association, at the Sixtieth Annual Session, held at Atlantic City, June, 1909.

With time came enlightenment but bewildering complexity. With the development of the percentage method of infant-feeding appeared a great number of complicated algebraic formulas by means of which the required amount of the various ingredients, cream, milk and sugar, were to be calculated, a separate formula for each ingredient. Well might the busy general practitioner shrink from the task of puzzling over them. He stood before them as Boussard stood before the trilingual Rosetta stone, realizing that it was the key to much knowledge, but appalled at the task of deciphering it. Especially would a physician in a community where most of the children are breast-fed be apt to turn to a printed direction which relieved him of future responsibility. And, indeed, it might seem not only the easiest but the wisest thing to do, for the extravagant claims attractively presented by the agent who personally seeks him out may be backed up, be it regretfully acknowledged, by the quasi-scientific articles of eminent men, who have sullied their professional reputation that gain might follow.

Another potent cause has been the difficulty in obtaining clean milk fit for an infant's use. Until recent years this has, in the majority of places, been nearly impossible, and a permanent sterile food "guaranteed to contain all the necessary elements of milk" is attractive. The ease of preparation and the fact that ice could be dispensed with have appealed to many as arguments for the employment of proprietary foods. It must not be denied that for use where ice and fresh milk are not obtainable, food unalterable in dried form is a necessity.

The very low fat content of these foods, that which renders them totally unfit for permanent use, has undoubtedly made them of temporary value. The most frequent mistake in artificial feeding with cow's milk is probably overfeeding with fat, and the change to a fat-free prepared food brings about a prompt improvement and also a firm conviction that cow's milk cannot be digested and that this particular food is henceforth necessary.

The laxative maltose which many of the foods contain and which aids in overcoming the constipation troublesome with artificial feeding commends them to many.

These are the factors that have chiefly contributed to the demand for proprietary foods.

Before considering arguments against their use, let us look for a moment at their composition.

They may be roughly divided into those with and those without dried milk; in each of these classes there are some with much unchanged starch, some with the starch partially converted by malt into dextrins and maltose, and some with the starch almost completely converted. In addition, certain other variations have been brought about by adding lactose or cane-sugar or white of egg. One and all, they are very deficient in fat, low in proteins and salts, and they contain large amounts of insoluble and soluble carbohydrates, starch, dextrins, maltose, lactose and saccharose.

There are two chief arguments against their permanent employment: used without milk they fail absolutely; used with milk they are unnecessary. Their composition shows plainly why they are impossible without milk; they are hopelessly deficient in fat and many are so low in proteins as probably to furnish less than the minimum amount of nitrogen required. The mineral content also is unduly low. Rickets is to be expected with them. Absolutely lacking in that very essential but vague quality of freshness, their use is followed in a

considerable proportion of cases by scurvy. The instance of the two manufacturers of different foods, advertised to be used without milk, who fed their own infants on their products with resultant scurvy, after which the infants were promptly cured by fresh cow's milk, is known to many. Since that time these foods are advertised to be used only with fresh cow's milk.

As permanent foods with milk they are unnecessary. There can be no doubt that many of them can be used with benefit with cow's milk, but just as satisfactory results can be obtained without them. There is no evidence whatever that they increase in any way the digestibility of cow's milk, and there is no reason why they should. The ingredients that they furnish can be furnished just as satisfactorily by much simpler and more economical means.

In ordinary modified milk the only food element requiring augmentation is the carbohydrate. Whether the addition be made by milk-sugar alone or by milk-sugar and starch, it requires no prepared food to do this. We can obtain any variety of flour and lactose just as easily and far more cheaply.

Many of the proprietary foods (the so-called malted foods) contain a large percentage of maltose. There can be no doubt that maltose is an exceedingly valuable sugar at certain times, and by its use results can be obtained which are almost impossible by other means. Why it acts satisfactorily when other sugars fail is another question to which no one has given a satisfactory answer. The verdict of clinical opinion both here and abroad is that under certain circumstances it accomplishes much, but no one claims that it is to be used permanently or except for clear indication. The pure maltose itself is so expensive as practically to debar it from use, but in solution with dextrins it is a by-product of breweries and may be obtained in a sufficiently pure form for use from many different dealers for an absurdly small sum, about 15 cents a pound.

We should also remember that it is not pure maltose that the proprietary foods contain, but a mixture of dextrins and maltose obtained in the same way by malting starches. Nor do we owe to the manufacturers the knowledge that maltose is valuable or its method of manufacture. Justus von Liebig deserves the credit for this; the manufacturers only appreciated the commercial possibilities.

There is no ground for the supposition that drying and powdering the protein of milk or of egg increases its digestibility or that of the various starches and sugars contained in the food. As to the value of the proteolytic and diastatic ferments, which it is claimed some of the foods contain, something will be said later. It is enough to assert here that the majority do not contain any. In order to preserve these ferments it is necessary to evaporate *in vacuo*. The process is expensive and whether the attempt is actually made or not by actual experiment it is found that there is often no ferment action whatever.

This brings us to a consideration of another of their disadvantages, namely, unreliability. They do not contain what they claim to contain, and their composition varies greatly from time to time, as shown by chemical analysis. A food which one year contained but a small amount of maltose and was, therefore, constipating and was used by numerous physicians after diarrhea for this very constipating action, the next year contained a large amount of maltose and so produced the very effect which it was supposed to correct.

That the manufacturers themselves realize that their products are uneven in composition is shown by the preface to a small pamphlet issued by one of the food companies. I quote from it verbatim:

The accompanying tables have been compiled from various authorities, much time and trouble having been expended in the search of authorities on the various subjects. The results are published mainly with the view of showing what an unlimited amount of variation may exist in the standards published by different scientists. Some of these variations, such as the discrepancies existing in the table of analysis of infants' foods are incomprehensible and only aid in proving that chemistry is *not* infallible and that practical results go ahead of theoretical indications.

Surely comment on this is unnecessary.

Liebig complained, in 1866, that the manufacturers did not grasp the very kernel of his ideas and gave wrong directions with their foods; and more than thirty years later Keller, who expanded the teaching of Liebig and has done a great service in showing the value of maltose and large quantities of carbohydrates in certain conditions, has complained of his inability to have his malt soup properly prepared.

For temporary use it is difficult to see how these foods are superior in any way to various modifications that can easily be made in any house, and if fresh milk is not obtainable they offer no real advantages over the best brands of condensed milk.

That these foods are harmful or unnecessary is not an isolated personal opinion. It is the almost unanimous belief of those who have studied and written on the subject in this country and in England, and this belief is shared by Czerny and Keller, who, as writers on infants' dietetics, speak with the greatest authority. These latter especially lay stress on the fact that in health or disease proprietary foods are unnecessary.

It is very doubtful if in disease anything more can be accomplished by these foods than by the skilful use of the ordinary foodstuffs. We can obtain at any time practically fat-free milk, gruels of various kinds, all kinds of sugars, mixtures of dextrins and maltose and white of egg; and again be it emphasized, there is no reason why, when clean, these should be more digestible because they have been evaporated, dried and powdered.

I said "skilful use of ordinary foodstuffs," but a certain amount of knowledge and skill is required to use even proprietary foods properly, on account of the great differences in their composition. The man without accurate knowledge of dietetics cannot feed correctly either proprietary or ordinary foods. This subject has been greatly neglected in the past and is only now beginning to receive the attention that it deserves; but it must receive it, for the demand is great. When the medical profession at large acquires a working knowledge of dietetics we may confidently expect that the use of proprietary foods will greatly diminish.

PREDIGESTED MEDICINAL FOODS

There is very little possibility for argument in regard to the predigested medicinal foods, the evidence is so overwhelmingly against their use. They contain peptones and proteoses, cane-sugar, maltose, dextrins and invert sugar in small quantities preserved in alcohol of 14 to 22 per cent. strength.

Let us give these foods the full benefit and consider that all the alcohol and all the extractives that they contain can be utilized by the organism, a hypothesis which is certainly very doubtful. By calculation it is readily shown that, measure for measure, two of the most representative and widely used of these foods have only a

little more than twice the nutritive value of whole milk and less than an equivalent amount of gravity cream—without the alcohol, they contain the same amount of nourishment as milk. The dose of these foods advised for a child of six months is a teaspoonful every four hours. This corresponds in nutritive value to slightly more than two ounces of milk, or slightly less than one ounce of cream in twenty-four hours, and when we consider that this six-months-old infant requires fifteen times as much milk or twelve times as much cream to maintain his body weight one readily sees how far they fall short of furnishing even a minimum amount of food.

Their method of production also consumes time and money worthy of being expended in a better cause. Assuming that such a food could be ingested without grave gastric, intestinal or other disturbance in sufficient quantity to nourish the six-months-old infant, it would cost about a dollar a day and would, moreover, require the child to take in twenty-four hours alcohol equivalent to six ounces of brandy, enough to terminate his short life or keep him in a continuous state of alcoholic coma. No! I think we may avoid without loss the predigested medicinal foods.

FERMENTS IN INFANT-FEEDING

The use of ferments in infant-feeding is confined almost entirely to two, a peptonizing ferment obtained from the pancreas and a diastatic ferment obtained from grain. They have their warm and their lukewarm adherents. There are, I think, no positive opponents except those who hold that their temporary use is unnecessary and their prolonged use apt to lower the infant's digestive power.

Were digestion a simple process and confined to a single ferment for each variety of food, there would be more ground for furnishing this ferment on the supposition that in gastrointestinal disturbance there is a diminution of the enzymes of the alimentary tract. But the process is not a simple one. It involves the interaction of several ferments with the requisite acidity or alkalinity best suited to each one and a proper physical condition in the stomach and intestines. Sufficient time for the action of each enzyme is also necessary.

With proteins it is no doubt true that stomach digestion can almost entirely fail and trypsin digestion be sufficient, but this digestion probably only goes to a certain point and the final breaking down into the amino-acids capable of absorption and utilization appears to be accomplished largely by the erepsin. To be logical we should supply this ferment also. It is doubtful, however, whether there is much of a reduction of the ferments in gastrointestinal disease and whether they are not almost always present in sufficient quantity to accomplish their work, provided other conditions are suitable. Dr. T. Wood Clarke, whose admirable investigation on the gastric digestion of infants in health and disease has just been published, tells me that with infants in whom there was no gastric digestion whatever this was due not to the absence of pepsin, but to the lack of hydrochloric acid, and that if this were supplied to the stomach contents peptic digestion was, in his experience, always prompt.

It is very likely that with intestinal digestion it is the conditions that are at fault and not the enzymes that are deficient. Certainly it is a fact that infants with gastro-enteritis absorb nitrogen from the food to an astonishing degree, almost if not quite as well as those in health. Thus Keller found that from 80 to 95 per

cent. of the nitrogen of cow's milk was absorbed by infants with gastrointestinal disease, while healthy breast-fed ones absorbed from 83 to 95 per cent. of the nitrogen. Adler found only a slight increase in the albumins and albumoses of the stools of infants with intestinal disease. There would seem, therefore, very little ground for believing that the proteolytic ferments are much diminished in disease or for supplying more.

Conditions are similar in regard to the amylolytic enzymes, though evidence of the absorption of the products of digestion is more difficult to bring forward.

Jacobowitsch has shown that the sugar-forming enzyme of the intestine is but little interfered with by illness, and Steinitz and Langstein demonstrated that lactase is present in the feces of infants acutely ill, even when there is lactosuria. This would indicate an abnormality of absorption of sugar or some interference with the action of the enzyme, which normally transforms milk-sugar into dextrose, rather than its deficiency. All the proof that we have, therefore, seems to show that ferments are present in sufficient quantity in disease to perform their ordinary functions, but that conditions are not favorable for their activity. The altering of conditions so that ferments may work to their best advantage is quite another matter. I do not wish in any way to deny that in exceptional circumstances, which there is not sufficient time to discuss, ferments may be of value. In the great majority of instances, however, I believe them to be unnecessary.

It is not, I think, a narrow view to take that predigested medicinal foods have no reason for existence, that proprietary infants' foods are unnecessary, and that in pediatrics we can almost entirely dispense with ferments. The propositions are well supported by fact.

49 East Fifty-third Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRs. EDSALL AND HOWLAND

DR. A. JACOB, New York City: These papers will stand for themselves and will not only be read but should do good work; but from personal experience I know they will not do so much good as they ought to. A good many times similar things have been told the profession and it has not minded them at all. Physicians will lean on the proprietary food and will swallow, singly and wholesale, the manufacturer's statements. That is my experience and there has been no sadder proof to me in my life of the gluttony, mental gluttony, displayed by many physicians, than by their eagerness to believe the men who are not medical men, who are not professional men, who have absolutely no reason for going into that kind of business, except to swell their bank account. I said that thirty years ago and forty years ago and I am at it still, and I do not believe I have made the slightest impression on my good brethren of the medical profession. Yesterday I passed a baby-food store and the man asked me, "Won't you take a specimen?" I said, "I will not take any specimen unless I pay for it." "Won't you take a little memorandum book?" I said, "I have one in my pocket." Then the man said, "Don't you like ours?" I said, "I have been writing against 'baby food' for forty years." With a sort of sheepish friendliness, he said: "Won't you write for us now?" I said, "It will take forty years more."

I believe that some more, and many more, will have to write against proprietary foods for forty years and still some will prescribe them or permit their patients to use them. Many manufacturers know they are robbing the people constantly. The people pay twenty or forty times as much for a proprietary food as it is worth, and although they know the same food can be had as that in the proprietary form at almost no expense. I believe I can only repeat what I said years ago on the same subject. I am sorry that it has to be repeated all

the time, but I am not sorry that men like Edsall and Howland should take the matter up and speak of it in the forcible and scientific way that they have this morning. There is one little point that I might speak about: that is the importance of supplying hydrochloric acid in a great many instances. It is easy enough to do it when necessary. The amount of acid in the stomach in a child and in an adult may be very large and still hydrochloric acid may be required. The acid in the stomach is not always equal. What appears to be hyperacidity credited to hydrochloric acid may consist of fat acids and even in such cases the introduction of hydrochloric acid is required. As a practical measure, it will be advisable to counteract the presence of the fat acids in the stomach by giving an alkali. Either before a meal in order to do away with the fat acid and afterward give hydrochloric acid during or after a meal. The hydrochloric acid may be given in the medicinal way or it may be given in the food, and I still recommend in a number of instances the preparation which I have advised over thirty years ago and which was given to me by my then assistant, who is a good chemist, Dr. Rudisch. That means additional hydrochloric acid to milk in our fat: One part of dilute hydrochloric acid; mix with 250 parts of water; mix with 500 parts of good milk; boil gently. This gives a good preparation, which contains hydrochloric acid and casein in solution. There is never any coagulation. It is digestible, and milk may be given in this way when hydrochloric acid is needed. This mixed milk may be treated as common milk, mixed with cereals. In many children, and in adults, I have given magnesia when there was constipation; giving prepared chalk when the bowels were loose. There is only a single reason why proprietary foods should be given, that is to enrich men who want to be enriched. There is no other reason for putting these preparations on the market. Still we are always repeating the same thing, always giving the money of our poor patients, or rich patients, as the case may be. So far as the latter are concerned, I do not see why their infants should not share in simple and less expensive and more salubrious foods.

DR. G. C. SMITH, Boston: About thirty years ago I heard Dr. Jacobi's teaching and have watched with a great deal of curiosity the development of the dietetic problem as regards children. It is interesting, as well as lamentable, to see that, in face of the fact that so much valuable work has been done by Drs. Edsall, Holt, Rotch and others on the dietetic problems in children, absolutely nothing has been done practically in the matter of the dietetics of adults. Now, it is well known that the two great periods of life in which we do most for our patients are, first, the infectious period, in youth, and, second, the period after 50, in which there are diseases which are often the result of early intoxications and the diseases of infancy, together with luxurious living. At this second period we do nothing in the way of dieting, and we can do much more in that way than by all other means. The chief reason why we have not done more in the matter of dietetics late in life is because the subject has not been taught in medical schools. It seems to me that we should try and give pupils in the undergraduate schools such a training in dietetics that they may go out and treat patients properly, and the postgraduate schools should give to the general practitioners, at least, such a knowledge of dietetics as would guarantee their patients better treatment than they receive with the aid of drugs. During the past twelve or fifteen years I have seen much good accomplished with dietetic treatment, especially in the care of the cardiorenal and the gastrointestinal diseases of late adult life, and I can emphasize particularly one point made by Dr. Edsall, namely, the importance of teaching practitioners and undergraduates the necessity of knowing the value of the different kinds of food which they give, because of the common statement, which I hear made by practitioners, that they can diet their patients by letting them take a little of everything which they desire and they can reduce flesh in that way. That is a very dangerous method. I have often heard physicians say they were reducing their own flesh by slightly diminishing the amount of food they take. This is often harmful also. The physician must know food values. The importance of this knowledge will be illustrated in the first case in which it is applied in active practice. After treating a good many hun-

dred cases of chronic affections, I must say that I have obtained much more satisfaction by adhering strictly to dietetic therapy than by drug treatment.

DR. F. E. STEWART, Philadelphia: Those of us who were interested in the early work of this Section know how difficult it was to get a baker's dozen to meet, but, thanks to the work done by the Council on Pharmacy and Chemistry and the government, we are getting to know more and the membership of the Section is growing. I agree with Dr. Smith that teaching of undergraduates, and especially postgraduates, will solve this problem more than anything else, and this Section can take an active part as it contains a number of the teachers engaged in such work.

DR. C. S. N. HALLBERG, Chicago: While we may agree that the use of digestive ferments *per se* is of little, if any, therapeutic value, they have a great use as pharmaceutical agents in the preparation of predigested food when required. For example, in the administration of peptone, it may be desired to give peptonized beef by rectum, and in that way digestive ferments would be useful. Nurses, for example, should be familiar with the action of the digestive ferments in the preparation of peptonized beef or egg peptone and its use in the preparation of milk. It is well enough to condemn these proprietary infant foods, but what is to take their place? There is a desire for a semiconverted wheat, dextrinated. Now what is to take the place of this? The old Philadelphia salt-bag product is the only thing that I know of and a great many people will not take eight or ten hours to prepare that, and so far as I know there is nothing really to take the place of these preparations which are desired in infant feeding. If preparations similar to this dextrinated flour as made by boiling it for a long time in a salt-bag could be had it would perhaps solve the problem of the expense of infant foods.

DR. GEORGE DOCK, New Orleans: Even in giving food by rectum one can get along without using digestive ferments. I think it is entirely unnecessary to teach nurses to predigest milk in order to use it by enema. For years I have given milk and egg without any predigestion. I am positively certain that as a general thing they are absorbed almost or quite as quickly as peptonized milk, or peptonized beef, and I feel sure, though not scientifically convinced, that a milk and egg mixture or milk alone given by enema is not so irritating as peptonized milk. Dr. Edsall referred several times to diabetes, and I would like to speak of that as a striking example of the slowness which Dr. Jacobi has so touchingly referred to in the assimilation of therapeutic knowledge. Dr. Jacobi is too pessimistic in regard to his teaching. He seems to think that no one has profited by his writings and his teachings. We all know this is not true, that he has many enthusiastic followers. In regard to diabetes, there is a striking example of forgetfulness or indifference, although we have accurate information in regard to underfeeding and the production of acidity, we see a large number of diabetics who have been permitted to go until they are absolutely starved, they have been kept on a carbohydrate free diet so long that they develop toxic symptoms and actually die. An exceedingly sad result of that sort of treatment has repeatedly fallen under my observation. A patient is put on rigid diet and fails visibly. He then puts himself under the care of an osteopath, or some one of that kind, and is told to eat anything he pleases. After a while his improvement is obvious and especially in appearance. The rapid improvement under the quack strikes people; they don't see the later developments of the case, they don't see how the patient again begins to go down and don't see how after the patient is put under rational treatment he makes a much greater improvement, which the quack doctor could never have attained, or at least only by chance. So it seems to me that the absurdity of putting patients on strict diet should be reiterated often. It is easy to demonstrate that the flours for which patients pay anywhere from 50 cents to \$1.00 a pound, contain as much starch as ordinary flour, and it is a simple matter to show such patients that they can take just as much flour or potato or other carbohydrate.

DR. B. FANTUS, Chicago: I am sure that we all agree on the necessity of more teaching in dietetics, but it is a very remarkable fact that the recent report on curriculum of the Council on Medical Education of the American Medical Associa-

tion allots only twelve or fourteen hours to the teaching of non-pharmacologic therapeutics, including, as it does, dietetics, hydrotherapy, electrotherapeutics, climatology and a number of other branches. That allowance of time is necessary for the teaching of dietetics alone, and as a great deal of stress is laid on this report, I herewith wish to protest emphatically against this portion of it. I believe the time allotted to non-medicinal therapeutics ought to be, at least, multiplied by five. I have one use for the proprietary foods, and that is when I wish to prescribe no diet. As it happens in the practice of all of us, there are conditions in serious diseases, for instance, in pneumonia, when the patient's digestive power is at the lowest possible ebb, when it is desirable to withhold food; but if the physician does that the patient's relatives will not stand it. They will protest, they will call in consultation, they will do everything under the sun to get this very sick patient fed. In such cases, if they pay \$1.00 a bottle for one of the proprietary foods and the patient is fed by the teaspoonful it will have the effect of giving no diet and the relatives will have the satisfaction of thinking that the sick one is getting food.

DR. S. SOLIS COHEN, Philadelphia: The tendency in therapeutics, as in pathology, seems to be to go from one to another extreme of the swing of a very long pendulum. At about the time that I entered on the practice of medicine, the enthusiasm over predigested foods was great. The teaching began in the laboratory and extended to the bedside. Predigested foods were prescribed for anything and everything and were recommended in addresses and articles by some of the same investigators who now find nothing too harsh to say of those who use them. Every one was expected to recover from everything, typhoid, cancer, diabetes and tuberculosis included, if only he got a teaspoonful of predigested food often enough and over a long enough period. Of course, such a mistake corrects itself; but it is equally illogical to go to the other extreme and say that predigested foods are always inapplicable. The fact that digestive ferments cannot climb trees is no reason for saying that the digestive ferments are not, under certain conditions, useful crutches, which can help the lame stomach or intestine over the rough places of the way, and be thrown aside when the necessity for their aid is past. I am convinced by long experience of the usefulness of what I am in the habit of terming pancreatized milk, rather than peptonized milk, that is, diluted milk with soda and pancreatin added before it is given to typhoid patients. This method greatly reduces the size and quantity of the curd passing into the ileum and by that much diminishes the liability to hemorrhage. I am also satisfied that there is less fermentation in the intestine, at least less distention, and thereby also a reduction of the liability to hemorrhage. And so there are many other conditions in which for a definite purpose and for a limited time the predigested food or the administration of a digestive ferment may be useful. My experience has been a little different from Dr. Dock's with predigested milk in rectal feeding. Fully pancreatized predigested milk beaten up with a whole egg and a few grains of pepsin has served me best. Dr. Dock, however, must be aware that in advocating rectal feeding of any kind, he is treading on dangerous ground, imperiling his reputation as a man of science. Certain able investigators have asserted that no food is absorbed from the rectum. Now that statement is, of course, as extreme and as definitely contradicted by the world-wide clinical experience of competent observers as the assertion that digestive ferments are never useful. There are certain times and conditions in which these measures are helpful and others in which they are futile, or even harmful. It is our function as artists in therapeutics, and I always lay stress on the fact that it is our function as practitioners of the art, as well as students of the science of medicine, to determine when they contraindicate the practice under discussion. In that determination we have to be guided by clinical phenomena; interpreting these in the light of all the exact information that laboratory investigations in chemistry and pharmacology, physiology and pathology may give us. I thoroughly agree with Dr. Fantus that there are a number of proprietary foods whose chief value is in feeding the family; and especially so in the case of children with so-called "summer complaints," when it seems to be absolutely impossible otherwise to avoid harmful interference in the nursing. Under such con-

ditions a few drops of a colored fluid called beef juice, given in sterilized water, or whatever medium one chooses to employ, saves trouble and gives the patient a chance to recover. In conclusion, I am very glad to learn that the college in which I have the honor to teach has been so far ahead in medical education. It is more than twenty-three years since I began lecturing in that college, at that time on extra-medicinal or, as I now term it, physiologic therapeutics, and I had a term even then of more than twelve hours. As I no longer hold that position I may add that the work is still done and done well as a part of the regular curriculum of the fourth year class.

DR. WILLIAM H. MERCER, Pittsburg, Pa.: One point that Dr. Smith made is, I think, of great value. He maintained that the general practitioner—I speak from the standpoint of the general practitioner—did not give enough attention to dietetics. The pediatricist does so. I can fully subscribe to this. In this connection I would mention a procedure which for the last four or five years has stood me in very good stead. Every patient who comes to my office is asked to tell me briefly what he eats. I put down his breakfast, his lunch and his dinner. Having this information, and I would like to lay stress on its value, I prescribe a diet. The trouble is not with the patients, they are always asking for dietetic instructions. If the physician knows what they usually eat then he can prescribe a rational diet.

DR. DAVID L. EDSALL, Philadelphia: I consider Dr. Mercer's suggestion an extremely important one. As I said in my paper, I think it still better to put down precisely what the patient eats and the time at which he eats it. Unless this is done the physician forgets many important details. I am strongly in favor of using temporary starvation in bad cases of alimentary disturbance and in cases associated with severe toxemia, such as Bright's disease. But starvation must be employed with full realization that it may be a very dangerous measure unless carefully watched, and I would protest strongly against some of the things that have appeared in the medical literature in recent years, such, for example, as the recommendation that typhoid patients be starved for even as long as ten or twelve days—most pernicious advice, and extremely dangerous. The cases I referred to in which fatal starvation occurred were not diabetes. A qualitative starvation death, so to speak, does occur in diabetes unquestionably, but I referred to direct starvation and was thinking particularly of two typhoid patients who were at death's door from inanition when I first saw them, and who died of this cause, having been fed for weeks on liquid foods that were essentially without any nutritive value. The danger of producing grave acidosis in diabetes is, however, very important. I have repeatedly seen patients become toxic with great rapidity and go quickly into coma because of sudden change of diet. As to ferments in their relation to predigestion of foods, I would note that I have been particularly interested in this question and have done some work on it, but my more mature judgment has led me to such a point that I have not for years ordered peptonized milk or pancreatized milk except in most unusual circumstances and then without any feeling that I could not have accomplished the same purpose in other ways. In regard to rectal alimentation, I would say that I do believe in figures, and I have done some work myself in regard to absorption in rectal alimentation. Many others have also worked on it, and I think it is clear that rectal alimentation accomplishes very little, only from one-fourth to one-sixth the amount necessary to maintain nutritive equilibrium being ordinarily absorbed. The work that has been done on this question has been chiefly when the patients were using predigested food by rectum. It would appear to be reasonably clear that predigestion accomplishes very little in rectal alimentation, because at most very little can be accomplished by this or any other means. Dr. Dock is right, of course, in his statement that if the predigestion is carried far the products will irritate the bowel. As to predigestion in typhoid fever, I can state that simple dietetic measures accomplish just as good results with much less trouble. I had an exceptional opportunity to observe this disease in Philadelphia, and have studied a series of over 4,000 cases of typhoid in about five years in the Episcopal Hospital; of this number I saw personally over one-fourth. Predigested food was used in scarcely any of these cases and yet the num-

ber of hemorrhages and perforations was well below the average of cases as generally reported from hospitals, and the only digestive disturbances that had any relation to milk were due to infected milk. When clean milk was used digestive disorder disappeared. I have been wholly unable to see that predigestion is either necessary or desirable in typhoid fever or similar cases, and the large series of records that I have just spoken of certainly did not indicate any necessity for it.

THE ETHICS OF ANIMAL EXPERIMENTATION *

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Is man morally justified in causing animals pain, and, if so, under what conditions? This is the moral issue raised by the practice of animal experimentation. The attitude of the average person on this question is no doubt more likely to be determined by temperamental bias and accidental prejudice than by any clear vision of fundamental principles. Nevertheless, it seems worth while in this day of increasingly bitter controversy over the experimental use of animals to inquire somewhat closely into the ethics of the case.

Historically, we find two fundamentally divergent views entertained on the general subject. Most widely prevalent—and sanctioned at one time or another by religious practices among all peoples—is the view that man is the overlord of the animals and may use them for his pleasure and profit, even to the point of robbing them of life. This view undergoes much softening and is hedged about with humanitarian restrictions among the more highly civilized races. Over against this is the belief that man has no right to take animal life or cause animal suffering. Buddhism, with its belief in the transmigration of souls, is the great religious embodiment of this view, although it has perhaps seldom gained a strictly consistent execution in practice. In estimating the import of this radical discrepancy in moral principles, one naturally looks to the origin of moral belief as possibly affording illumination.

Moral principles have generally derived their power over human action from one or more of three distinct sources: (1) They have been accepted as embodying divine law implanted in the consciousness of each individual, or revealed through the inspiration of holy men. This is the intuitive view of morals. (2) They have rested on custom, law, or social and political usage. This is the traditional view. (3) They have been justified by the happiness and social welfare which it is believed follow on obedience to them. This is the scientific view.

Under no one of these conceptions of the origin of morality do we find immediate and unambiguous guidance in the problem of animal experimentation. Religious teaching is equivocal. Certainly most of it sanctions the taking of animal life, and the consciences of primitive people at least seem to cause them no distress, even when they torture dumb creatures. Custom has varied among different races, but, in the main, has undoubtedly favored the treatment of animals in accordance with the unbridled wishes of man. Even among civilized peoples,

gelding, dehorning and other mutilations of animals are countenanced under conditions which unquestionably occasion much suffering. At the present time controversy is carried on almost wholly under the ruling conceptions of the third division—i. e., the issue is argued as one of fact concerning the consequences of animal experimentation. In any event, this is the only point at which argument may hope to convince the open-minded, one way or the other. Obviously, the argument from custom proves nothing and convinces nobody. The man who believes in the transmigration of souls between human and animal forms cannot be dealt with in the limits of this paper, but in the Anglo-Saxon world, at least, he is to all intents and purposes non-existent. Certainly the great mass of modern critics of experiments on animals do not rest their case on any such foundation. They assert that needless pain is an unmitigated evil, and that its gratuitous and intentional causation is a sin and a crime. They allege that animal experimentation is (1) not justified by any results it has yet attained and (2) that it is demoralizing and brutalizing in its influence, both on those who conduct it and those who observe it.

Certain more conservative critics urge that, although its occasional employment has resulted in justifying benefits both to man and the animals, it is done far too extensively, is done when the results cannot possibly justify it, and done carelessly and with indecent disregard of all the humanities. Clearly, this is an indictment drawn on alleged facts, and no verdict can be rendered without an examination of the facts.

If it be granted, however, that the experimental procedure is ever justified by its results, the basal ethical issue is closed. It only remains to make sure that in a given case the warrant is certainly adequate, that the minimum of pain is caused the creatures used, and that the indirect effects on the public and on students are not such as to augment the spirit of cruelty or insensitiveness to suffering.

Fortunately, or otherwise, we have no calculus by which we can estimate the amount of pain caused an animal by a given experimental operation, or the amount of suffering saved to other creatures as a possible result of its sacrifice. But with the literally inestimable benefits which are daily being reaped in the prevention of smallpox and in the amelioration or prevention of diphtheria—to mention only these two cases, out of a rapidly lengthening list—it is difficult to understand how any one can honestly frame a sweeping indictment of operations on animals to which these victories and others like them are unquestionably due.

As a matter of fact, the case is somewhat complicated in the public mind by the appearance among the extremer critics of not a few gentlemen who sign themselves M.D., and who claim a professional knowledge of the details of the case. To be sure, the overwhelming majority of medical men, including all the great leaders of the profession and all the great medical organizations, are staunch defenders of animal experimentation.

It would be ridiculous to pretend that all operations on animals have such striking justification, either in purpose or in result, as those which led to the discovery and perfection of vaccine or antitoxin. Many of them frankly fail to result in immediate scientific progress, and many are done for purposes of instruction, the beneficent results of which are always uncertain and frequently long deferred. But, as has been said above, the fundamental ethical issue is closed, once it be granted that there are *any* conditions under which ani-

* This article is one of a series issued in pamphlet form by the Council on Defense of Medical Research of the American Medical Association for circulation among the public. Six of these pamphlets are now ready, taking up the questions of ethics, diagnosis, cancer, vaccination, the live stock industry, tuberculosis, etc. An editorial survey of the series appeared in THE JOURNAL January 1 and a list of the pamphlets, with prices, was given on advertising page 8 of that issue.