various kinds of fat are not very great from a chemical point of view, although it is always an unpleasant thought that the fat from animals that have died may return to the house in the form of soap. A white or yellow soap having a good smell is not made from bad fat, and hence is more appetizing.

A method formerly much in use consisted in mixing green soap with starch paste, a mixture that could not be detected by the naked eye, especially if colored with caramel. On attempting to dissolve it in ordinary burning alcohol, a white coagulum forms.

From the foregoing it is sufficiently evident that those who buy soap to sell again have every reason to keep a sharp lookout on those who furnish them with soap.—*Polvt. Notice.*

BOVINE AND HUMAN MILK: THE DIFFERENCE IN ITS ACTION AND COMPOSITION.

By C. HUSSON.

M. MEYNET, in a remarkable report upon condensed milk, has raised a question which it is important to have solved in the interests of infants. This is my excuse for presenting to the French Society of Hygiene certain observations on this subject.

Is woman's milk richer in fatty matters and sugar in proportion to the caseine than that of the cow? Is the affirmative, sustained by a large number of chemists, a mistake that ought to be corrected?

Such is the question that needs to be answered.

In my last work on milk, my aim was to report new experiments, and hence I gave only the analysis of M. Colawell. By the side of the essays of MM. Doyère, Millon, Commaille, and Wurtz, I put those of Liebig, and quoted an interesting chapter written on this question by M. Caulier, in Dechambre's Encyclopedic Dictionary. These are the authorities upon which to base any opposition to the analyses of Boussingault, Regnault, Littré, and Simon, savants of no less renown.

The differences are easily explained.

Woman's milk is rarely to be had in sufficient abundance to make a complete analysis of it. In the country especially a few precious drops, obtained with difficulty, are carried off in a thimble to be placed under a microscope, where the number of fat globules are counted, and it is examined to see if they are not mixed with globules of colostrum.

It will be necessary at the outset to know whether the analyses given refer to milk drawn from the breast before nursing, or at the end. In the former case there will be an excess of caseine, in the second an excess of fat present. This is the reason that in nursing infants the intervals should not be too long, or the child will not be able to empty the breast completely, and it will obtain a milk too rich in caseine, too poor in butter, and one that it cannot digest.

This is the first proof of the importance of fatty matters for the alimentation of babes.

Let us turn to the second.

At birth, when the milk is still in a state of colostrum, the fluid contains a variable quantity of albumen coagulable by heat, much less caseine, and an excess of butter and sugar.

Cow's milk, immediately after calving, contains more butter and less caseine than milk produced some time later, when the specific character of ruminants begins to appear in the calf, that is to say, when it commences to graze the milk coagulates in the stomach. As in other mammals, an excess of fat helps digestion by subdividing the caseine and emulsifying it. But the milk of an animal recently calved is reserved for its young, and it is not until the time of weaning that the lacteal fluid is offered for human consumption.

Thus it is that the nursing of a day receives milk many months old and heavily loaded with caseine. This milk it cannot digest because the emulsifying element, the fat, is not present in it in sufficient quantity in proportion to the coagulable matter. We must not forget either that the difference in coagulation holds also with respect to difference in the age and in the kind of animal. Just so the rennet of a sucking calf has a greater power of coagulating cow's milk than that of a sheep, and *vice versa*.

"Clinical observation," says Dr. Condereau, "shows that all young infants digest human milk very easily and cow's milk very imperfectly. When it is fed on the latter, in the excreta will be found numerous fragments, sometimes very bulky, of undigested caseine. In most cases this caseine suffers more or less decomposition in the alimentary canal, which gives to the feces a tainted odor recalling that of putrid Roquefort cheese.

"The excrement vary in appearance as much as they do in odor. Frequently the caseous clots are not to be seen, and the stool has a clammy look reminding one of glazier's putty, while the color varies from dirty white to pale grayish yellow. That is due to the fact that the composition of the milk from different animals is far from being constant.

"The proportions of albumen to those of caseine are especially varied. For woman's milk the proportions are as 100 to 122.72. In goat's milk the proportions are 100 to 173.09. In cow's milk it is as 100 to 239.20.

"The conclusion is this: Caseine is not a food at all for the new born during a space of time, the duration of which is to be determined experimentally.

"This substance is a harmful burden that interferes with the regular action of the digestive organs. It is a premature food, and the more abundant the more injurious.

"Albumen on the contrary remains fluid in the presence of the gastric juice; it is separated from the other aliments by coagulation of the caseine. It is absorbed entire either in its natural state or in form of peptone."

According to clinical observation, it is still the fats that give to milk its hygienic value, and the excess of caseine is an obstacle to its digestion.

However, if cow's milk is not easily digested by children, experience proves that there are other kinds of milk, from other animals, which young stomachs are able to bear more easily. There are many proofs of this fact.

M. Tarnier, speaking before the Academy of Medicine on the artificial nourishment of the new born, reports that the milk of cows and goats, pure or diluted in different ways, that condensed milk and Biedert's cream, have always given disastrous results at the Maternité in Paris, but that the mortality of the new born was considerably reduced from the day when ass's milk was introduced as food.

Ass's milk was given pure for six weeks or two months; then cow's milk diluted with one-half water until six months old, followed by pure cow's milk. This is the most rational course of artificial feeding.

Prof. Parrot reports analogous results obtained at the nursery opened at the Hospice des Enfants Assistés. By the aid of ass's milk he saved a number of the little syphilitics.

The following are the numerical results: 86 infants with

hereditary taint of syphilis have been at the nursery. Of 6 fed exclusively on cow's milk, only 1 survived and the other 5 died. Forty-two were suckled by goats, of which 8 lived, 34 are dead, which is equal to a mortality of 80.9 per cent. Thirty-eight were suckled by an ass, of which 28 lived and 10 died; a mortality of 26.3 per cent.

Certainly these figures prove eloquently enough what chemical analysis shows, that ass's milk, being better borne by the infant's stomach, ought to have a composition resembling that of woman's milk. This analogy is not found to consist in the quantity of fat, but in the small amounts of dry residue (total solids) and of caseine.

Let us now examine the objections raised by M. Meynet. Food has a considerable influence upon the composition of milk; this fact, stated by M. Riche in his treatise on chemistry, seem to be accepted by all.

The milk of carnivore is excessively rich in caseine; that of herbivore much less.

The food of woman, who enjoys a mixed alimentation, ought to have a composition intermediate between these two, and consequently ought to contain more caseine than that of the plant eaters. This is the logical deduction.

At first this reasoning misleads one, but numerous objections present themselves.

The food, no doubt, has some influence upon the composition of the milk of animals of the same species, but every animal can secrete something independent of any food, just as one kind secretes musk, another castor, etc. Yet it would not be an anomaly if an excess of caseine in proportion to the other substances was a true characteristic of ruminants.

But we admit that the milk of all mammals ought to have identically the same composition if their food suffered no modifications.

What is the food of ruminants? Without doubt it is essentially vegetable, and the plants of the field constitute the element par excellence of their nurture. These plants contain a large excess of carbohydrates in proportion to the nitrogenous.

But what are these other substances? What role do they play in digestion?

They are composed in great part of fibers and cells that suffer no change in the animal economy, and which are not acted upon by the gastric juice, as proved by their occurrence in excreta. The carbon is found almost unchanged, so that the excrements of herbivore, when dried, form a valuable fuel. Ruminants are compelled, in order to obtain nourishment from the plants that they eat, to extract their juices by repeated pressure (as in chewing the cud); and what do these soluble juices contain? Some saccharine substances, a little fat, but mostly albumen and vegetable caseine, that is to say, the substance which predominates in their lacteal secretions.

What, on the contrary, is the food of woman?

No doubt she gains much strength from the lean, muscular flesh that she eats, but besides this she has butter, oil, f's of all kinds, sugar, starches, and alcoholic beverages, all of which are favorable to the production of butter in the milk. Hence, aside from her physical constitution, the food of woman alone explains the relative excess of non-nitrogenous substances.

Nitrogenous articles of food are expensive, while the other forms of nutriment are to be had in the form of potatoes, beans, and bread, products sold at a reasonable price. Yet logic demands that there shall be an excess of butter in proportion to caseine in the milk.

The discrepancies in analyses of woman's milk are easily explained by the mobile and impressible character of woman.

If bad treatment and bee stings are able to modify the composition of cow's milk, how much more ought the emotions of all sorts, which disturb the heart and head of woman, to change the composition of her milk?

But if new analyses seem to be needed, they ought to be made. This question is too important to rest in suspense. The mean composition of human milk for the first two months after delivery ought to be established. In chemistry, as in mathematics, figures alone are convincing. But from what has been said it is logical to conclude that an excess of caseine in milk is unfavorable to good digestion, while an excess of butter is favorable to it.—*Translated from Journal d'Hygiene, March 1, 1883.*

CEREAL FOODS IN THEIR RELATION TO HEALTH AND DISEASE.

By F. R. CAMPBELL, A.B., M.D.

THE cereals are subject to many diseases which retard their development, rendering them unfit for food, and even poisonous. The relation of unwholesome foods to the diseases of the animal body are now being thoroughly studied, recent advances in chemistry and microscopy contributing valuable aid to the prosecution of such investigations. Some enthusiastic advocates of the germ theory of disease believe that many, if not all, the so-called disease germs may be transplanted into the human system with the food ingested. But whatever may be the real truth in regard to this subject, it has been positively demonstrated that many diseases of the human body may be produced by unwholesome food. The specific symptoms produced in man by the various grain diseases are not accurately known, consequently our remarks upon this subject must be of a very general character.

Pappenheim divides the diseases of the cereals into two classes, internal and external. The internal diseases are those depending upon conditions of soil, climate, cultivation, etc., and may be neglected in our discussion, as they produce no special disease of the body, only impairing the nutritive value of the grain.

The external diseases are of much greater importance, as they probably produce some of the most fatal maladies to which the human race is subject. These external diseases of the cereals are due to parasites, which may be either of an animal or vegetable nature. Among the animal parasites may be mentioned the *weevil*, *vibrio tritici*, which feeds upon the starch cells of the grain. Grain attacked by this parasite was at one time supposed to be injurious to health.

In 1844 the French Commission appointed to examine grain condemned a large quantity imported with this parasite, but afterward reconsidered their decision and permitted its sale, concluding that it was deficient in nutritive properties, but not otherwise unwholesome. Rust is the most common disease of the cereals, produced by vegetable parasites. Like the other diseases of this class, it is most prevalent in warm, damp seasons.

Prof. Hensboro is of the opinion that rust is but an earlier stage of mildew or blight, the one form of parasite being capable of development into the other, and the fructification characteristic of the two supposed genera having been evolved on one and the same individual.

Blight is a term loosely applied to a number of parasitic diseases. In it are included mildew, coaries, and even rust and smut. The fungi producing these diseases attack the plant and seed at various stages of its growth. The whole kernel is affected, and not merely the external coat, as is sometimes maintained. When blighted grain is sown, the disease recurs the following year, often making it necessary to import new seed before the disease can be eradicated. Various remedies have been used to destroy the spores of these fungi, but all are uncertain and some are dangerous to health. Special machinery and methods have been employed in the mills to separate the mildew from the grain. Some of these succeed in removing the fungi and discoloration from the surface of the grain, but have no effects upon the parts within. Blighted grain is soft, and has an unpleasant taste and smell, and bread made of it is liable to be heavy and sodden.

It is undeniable that the use of blighted grain as food is exceeding dangerous to health. It is a well known fact that vegetable parasites may attack animals; the silk worm disease produced by the *Botrytis baniana* being an example. It is stated that the same vegetable parasites which produce plant diseases, when transmitted to the animal body produce special affections, the form and appearance of the germs being altered by their environments. The same germs developed under different conditions of temperature and surrounding medium, assume forms so various that they have been supposed to belong to different species and even different genera. If there is any truth, then, in the germ theory of disease, it is not so very improbable that a fungus which will produce blight in grain may cause cholera or tetanoid fever in an animal.

Hallier, the famous physiological botanist, observed in 1867 that there was a peculiar disease of the rice plant associated with an epidemic of cholera. Rice plants fertilized with the discharges of cholera patients were affected with blight. A concentrated infusion of the blighted grain would produce changes in all animal substances, blood and albumen being converted into thin odorless products resembling in every respect the material found in the kidneys of cholera patients.

The most formidable of the diseases attributed to the use of diseased grain is cerebro-spinal meningitis, commonly known as spotted or blanoid fever. The disease is rare in England, but is frequently epidemic in the United States, in Ireland, and on the Continent. In 1873, in the State of Massachusetts alone, 747 persons died of it, and other epidemics even more fatal have lately occurred in New York and Michigan. The disease is a nervous fever attended with convulsions, the pathological lesion being congestion and inflammation of the membrane of the spinal cord and brain. Dr. Richardson in writing on the nature and causes of spotted fever concludes that it is due to the use of diseased vegetable substances, especially grain, and from a careful analysis of the statistics of this disease reported by the Michigan State Board of Health considers it demonstrated that "under favoring condition for its action diseased grain received as a food is the primary cause of the phenomena which characterize the disease." These views are substantiated by the experiments of Dr. H. Day, who found that by feeding rabbits on unsound grain, spasmodic affections were produced, due to inflammation of the membranes of the spinal cord and brain.

In warm climates, pellagra or Italian leprosy is said to be produced by eating diseased maize, which forms the principal article of food among the poorer classes of the rural districts. Pellagra is epidemic in northern Italy and the south of France. The disease is manifested by a redness and discoloration of the exposed parts of the body. It is most active during the hot weather, the inflammation subsiding in the winter, leaving a pigmentation of the skin. Each year the symptoms become more alarming, nervous disorders finally setting in, and a large number die insane. The disease is most prevalent in the country. In the towns, where maize is supplemented by other articles of food, it does not exist.

Ergot is a very common disease of the cereals. The fungus producing it was discovered in 1853, but for centuries previous its injurious effects upon the human body were recognized, and it was observed that ergot of rye was the most poisonous. Taken in large doses, ergot will produce nausea, vomiting, diarrhoea, headache, and weakness of the heart. In small repeated doses it will produce contraction of all the unstriated muscles, as those of the blood vessels, the womb, and intestines. Ergotism is the name given to the disease produced by the continued use of grain affected by this fungus. Aitken describes it as "a train of morbid symptoms produced by the slow and cumulative action of a specific poison peculiar to wheat and rye, which produces convulsions, gangrene of the extremities, and death. In countries where rye bread is much used ergotism is sometimes epidemic. This was a frequent calamity before the introduction of suitable purifiers into the mills. There are two varieties of the disease, the convulsive and the gangrenous. The convulsive form begins with tingling of the extremities, drowsiness, and headache, followed by pain in the joints, violent muscular contractions, and death. The gangrenous variety begins with coldness and weakness of the extremities followed by gangrene and sloughing. This form is somewhat more fatal than the convulsive, the mortality of those affected being about 90 per cent.

Mouldy grain and bread have also caused poisoning. Prof. Varnell states that "six horses died in three days from eating mouldy oats. There was a large amount of matted mycelium, and this when given to other horses for experiment, killed them within thirty-six hours." The writer has himself seen seven hogs die within a few days while being fed on mouldy corn. Flour which has become stale may produce similar injurious effects, although most of the germs are destroyed in the process of baking. It is quite probable, however, that a poisonous substance is generated by the mould fungus, which cannot be destroyed in this way.—*Milling World.*

MOIST AIR IN LIVING ROOMS.

THE injurious effect of dry heat in inhabited rooms is quite generally known, and different methods have been suggested for moistening the air. To test the effectiveness of these methods, J. Melikow, of St. Petersburg, has estimated the quantity of moisture in the air of different rooms by means of August's psychrometer, and also tested the different methods of increasing the moisture. He arrived at the following results, which are of decided practical value:

1. When large and small open vessels filled with water are placed in the room, they do not increase the moisture of the air at all.
2. Tubs of water of the same temperature as the room and parlor fountains have very little effect.
3. When hot air is used, open vessels of water placed over the pipes have no effect at all.