opening-up of new lands, has also helped to swell the number of the deaf,—there is certainly something to glory in, that we have still a much smaller percentage of deaf-mutes than the ideal countries we are invited to take as our models.

BUTTER AND OLEOMARGARINE.

THE wholesomeness of artificial butter has been affirmed by eminent chemists and physiologists, both in Europe and in this country, who have devoted attention to this subject, when it is prepared from carefully selected and sweet fat of healthy animals, and the process conducted in a proper and cleanly manner. (See in this connection the statements of Dr. C. F. Chandler of the School of Mines, Columbia College, New York; Professor Henry Morton, Stevens Institute, Hoboken, N.J.; Professor G. F. Barker, University of Pennsylvania, Philadelphia; Professor G. C. Caldwell, Cornell University, Ithaca, N.Y.; Professor S. W. Johnson, Sheffield Scientific School, Yale College, New Haven, Conn.; Dr. J. W. S. Arnold, University Physiological Laboratory, New York, submitted to the Senate Committee on Agriculture and Forestry; and by Sir F. A. Abel, Mr. Herbert P. Thomas, Mr. A. H. Allen, president of the Society of Public Analysts; Mr. Otto Hehner, secretary of the Society of Public Analysts; Dr. James Bell, principal analyzer to the Commissioners of Inland Revenue, and others before the English Select Committee.)

Mr. Herbert P. Thomas, principal clerk of the Local Government Board in charge of the Public Health Department, stated in his testimony before the Select Committee[1] that they had no evidence that butterine was injurious to health. "It is a very curious thing that our inspectors have connected epidemics with a very large number of substances; for instance, epidemics have been supposed to be connected with milk, with cream, with hams, and with cheese, but not with butter or butterine."

The most scrupulous cleanliness should be observed in the manufacture of oleomargarine. Even a small amount of fat, if allowed to adhere to the apparatus and utensils used, is liable to decompose in such a way as to spoil the succeeding batch of materials worked up. Fats can undoubtedly be deodorized by means of chemicals, but it is very questionable whether they could be used as butter substitutes, owing to the increased expense involved to make them perfectly tasteless, as it is very hard to get rid of the tainted taste.

That there is a remote possibility, especially when the cattle and hogs are not inspected by a competent veterinarian before slaughtering, of the fats used containing parasitic organisms may be granted, but the remedy is self-evident. The chance of disease being conveyed in this way is very small, but not yet proved to be non-existent.

Against oleomargarine there has been a large amount of legislation directed, with a view of controlling its production and sale, and with the unexpected result of increasing both.

Whatever may have been the production of oleomargarine in this country before the national law went into effect, we have no reliable statistics; but since the 1st of November, 1886, we have the monthly statements of the manufacturers, duly attested under oath, of the quantity of oleomargarine made and removed from the factories, tax paid for domestic consumption, or in bond for export, each day of the month. These statements also give the quantity and kind of materials employed in the manufacture, and the name and addresses of the parties to whom the oleomargarine is sold or consigned.

Table IV shows the quantity of oleomargarine produced in this country from Nov. 1, 1886, to Nov. 1, 1889.

Table IV.—Showing the Quantity of Oleomargarine produced, withdrawn Tax paid, for Export, and Lost or Destroyed in Manufactories, from Nov. 1, 1886, to Nov. 1, 1889.

Year.	Quantity Produced. Pounds.	Withdrawn Tax paid. Pounds.	Lost or Destroyed. Pounds.	Withdrawn for Export. Pounds.
On hand Nov. 1, 1886...	181,090			
From Nov. 1, 1886, to Oct. 31, 1887.....	31,114,682	29,692,966	55,260	1,029,880
Highest, March, 1887.	3,568,254	3,512,138	12,472	96,499
Lowest, July, 1887....	1,208,638	1,170,136	1,191	33,240
From Nov. 1, 1887, to Oct. 31, 1888.....	35,530,146	33,655,423	6,442	1,937,907
Highest, March, 1888.	3,940,727	3,824,672	2,998	155,761
Lowest, July, 1888....	2,084,317	1,925,762	185	155,200
From Nov. 1, 1888, to Oct. 31, 1889.....	35,132,060	32,902,802	6,741	1,694,851
Highest, Dec., 1888...	4,181,317	4,025 336	10	109,385
Lowest, June, 1889....	1,575,362	1,514,658	—	58,579
On hand Oct. 31, 1889...	429,219			
Total for 3 years..	101,786,888	96,251,191	68,443	4,662,638

These figures are interesting because oleomargarine is the only food substitute about whose production and sale we have positive knowledge.

During this period the number of factories decreased from 37 to 21, notwithstanding which fact the production and sale increased steadily. Oleomargarine is produced by expensive machinery in the large factories in such quantities that it can be sold nearly the whole year round at a less price than butter, although the high rate of tax paid by both the manufacturers and dealers, which is, of course, ultimately paid by the consumer, necessarily increases the market price. In the spring and early summer months dairy butter is generally cheaper than oleomargarine, and consequently less of the latter is made and sold during that time. In July the production of oleomargarine reaches its lowest limits for the year, and obtains its highest in March.

The system followed by the Internal Revenue Bureau is such that each manufacturer's package can be traced from the time it leaves the factory till it reaches the hands of the retailer or consumer, or leaves the country.

The high rate of tax demanded from the manufacturers and dealers was undoubtedly intended to be nearly or quite prohibitory; when compared with those paid by other special tax-payers, rectifiers, brewers, etc., as shown in Table V, the amounts are from three to ten times as high.

[1] P. 9, Special Report from the Select Committee on the Butter Substitutes Bill, ordered by the House of Commons to be printed, July 4, 1887.

Table V. — Rate of Special Taxes per Annum.

	Oleomargarine.	Liquors.		Tobacco Manufactured.
		Distilled.	Malt.	
Manufacturer.....	$600 00	$200 00[1]	$100 00[2]	$6 00
Wholesale dealer.....	480 00	100 00	50 00	30 00[3]
Retail dealer.....	48 00	25 00	20 00	2 40

[1] Rectifier of 50) barrels, or more, per annum.
[2] Annual manufacture, 500 barrels or more.
[3] Pedler of tobacco, first-class.

It is undoubtedly a fact that if the retailer's tax were as low as that for tobacco, the manufacturers of oleomargarine would pay the same to have at least one dealer to handle their goods in every village and town in this country. As it is, in the Chicago district, where there are seven factories, there were 974 retail dealers doing business in April, 1889, compared with 726 the April previous; in the Boston district, with its one factory, there were 460 retailers in April, 1889, and 405 at the corresponding time in 1888; in the Connecticut district, with four factories, there were 424 in 1889, and 384 the year previous; and in Michigan, with no factory, there were 290 and 267 respectively for the same periods. These four collection districts contain over one-half of the total number of retail dealers doing business at the close of the special tax year ending April 30, 1889. This would seem to indicate that where the public has been brought in unprejudiced contact with oleomargarine, as sold on its own merits, they have found it palatable and suitable to their wants.

I have been in retail stores in the lumber and mining regions of the upper peninsula of Michigan, in Boston, Chicago, and elsewhere, where as much as one-half to one ton of oleomargarine is sold per week, in quantities of less than ten pounds to any one purchaser at one time, put up in packages duly branded with the word "Oleomargarine," as required by the law and regulations.

From a personal inspection of some of the largest factories, I am convinced that the greatest cleanliness is observed throughout all the operations; that nothing but the freshest animal fats are used; that machinery is employed as much as possible, and large quantities worked at a time, to reduce the expense. The factories are as well arranged as the best creameries; and it is to the manufacturer's interest to produce a palatable and wholesome product, which is, however, not intended to compete with "gilt-edge" butter.

In April and May, 1888, with the aid of the local Internal Revenue officers, I made an inspection of the material sold for butter in several of the large cities. Over eleven thousand samples were collected, and it must be said that about ten per cent of these were unfit for human consumption, being exceedingly rancid, and in many cases actually putrid; nevertheless they were genuine butters, and not mixtures containing foreign fats. In our large Eastern cities there are dealers in low-grade butters who put on the market what is known as "ladle-packed" or "hash" butter, a compound of the remnant stock of country dealers worked up "with additional coloring matter," to please the eye and make the mass uniform. It is about as savory a grease as "prime steam lard." One effect of the oleomargarine law has been that dealers in "hash" butter have to sell it on its own merits, and not call it oleomargarine for an excuse, when their customers complained of its rancid taste, as they did before the law was passed.

A few years ago the dairy commissioner of one of our large States considered it necessary to issue a circular to butter makers, especially to those having one or two cows, embodying certain directions in regard to handling milk and butter, which implies such want of common cleanliness in these manipulations by the ordinary butter makers, that I cannot refrain from quoting from it: —

"Third.—Be clean and decent about your milking. Never wet the teat with milk and let the drip from your dirty hands drop into the pail to spoil the flavor of the milk. Remove the milk from the stable or all impure odors as soon as possible. Use no milk pails or milk vessels of any kind made of wood, but have all made of tin, and never use them except they are scalded with very hot water and made perfectly sweet and clean.

"Fourth.— . . . Have loose covers on the cans to prevent flies, bugs, and millers getting into the cream, and put this whole business [the cans] in some room or place where all the foul odors of a kitchen or pantry can not spoil its flavor.

"Sixth.—When you strain the milk into cans, have your cloth milk-strainer folded from four to six thicknesses, so that all manner of filth that ever gets into it will be taken out. Scald the cloth then thoroughly. Never use an old sour strainer for this work. . . . Have a thermometer to test this [the temperature of the cream], and not stick your finger in to tell by."

I am afraid that the butter makers of this State are not the only ones guilty of such practices.

Where butter is made in small quantities at a time and "salted down" between churnings, and some time elapses before the tub is filled, the lower layers have probably commenced to ferment, and before long the whole lot is rancid.

When care is taken, as in large creameries, the butter maker never experiences the least trouble in selling his product the year round at a remunerative price, and it is only the careless man, who makes an inferior article, that experiences this difficulty.

The adulteration of butter with water and salt is as much a fraud on the public as the addition of foreign fats, coloring matter, or any other form of deception. Water and salt are expensive luxuries when one has to pay at the rate of twenty-five to forty cents a pound for them, yet that is what happens if a purchaser buys four pounds of a butter containing twenty per cent of water and five per cent of salt —not an uncommon case.

There is a special provision in the law in regard to the use of any unwholesome material or product in the manufacture of oleomargarine, but no sample has ever been submitted to the Commissioner of Internal Revenue under it.

Owing to the construction by the Attorney-General of Section 2 of the oleomargarine law, the internal revenue officers exercise no control over the production and sale of oleo oil, although the Commissioner has recommended that Congress amend the law in that regard. From inquiries that were made in June, 1888, by the collectors of internal revenue, there was found to have been produced during

the year ended June 30, 1888, 69,623,795 pounds of oleo oil in nine States. There were used in the manufacture of oleomargarine, as stated in the manufacturers' returns, 12,265,800 pounds during that period, and 30,146,595 pounds were exported, leaving 27,211,400 pounds used otherwise. As oleo oil is sold at a much higher rate than tallow, it is presumable that this large quantity is used in some other food products, as emulsified cream and cheeses.

EDGAR RICHARDS.

NOTES AND NEWS.

IT is proposed to construct a railroad tunnel under the Narrows in New York harbor, to connect Long Island with Staten Island. A company has been incorporated to build the railroads connecting with the tunnel, and part of the route has been surveyed. The total length of the tunnel will be less than two miles, a great part of the way through easily worked stone.

— The first convention of the North American Association for the Propagation of Volapük will be held in Boston, Aug. 21, 22, and 23. According to Article IV. of the Constitution, "Any Volapükist may become a member by sending one dollar to the Lepenädan," Mr. C. C. Beale, No. 180 Washington Street, Boston, Mass. This entitles to the grade of membership called kopanel or associate member. "Upon proof of proficiency a kopanel becomes a kopanal or active member. Only the latter may vote or hold office."

—The thirty-ninth meeting of the American Association for the Advancement of Science will be held at Indianapolis, Ind., beginning on Aug. 19. Members desiring to attend are expected to pay full fare at the point of starting, and should have the ticket agent furnish a certificate which will entitle the holder, upon being indorsed by the secretary of the association, to a return ticket at one-third of the regular fare. The railroads of the country are divided into different passenger associations, and if the member's route covers more than the territory covered by one such association, a separate certificate must be taken covering each association's territory traversed. The railroad companies have established the following rule: "No refund of fare will be made on any account whatever because of the failure of the parties to obtain certificates." The local secretary, or assistant, will be in attendance at a temporary office in the Union Station, or immediately opposite, during the first two days of the meeting, while members are arriving, to furnish any special information which may be desired. The place of meeting is in the new Capitol Building, where rooms will be furnished for all the officers, sections, and committees under one roof. The post-office authorities have kindly arranged for a branch office at the Capitol, so that all mail matter will reach its proper destination if addressed, "Care of A. A. A. S." A room will be provided for storage of apparatus and specimens sent by express, and all packages may be addressed "in care of the local secretary." The council will meet at the Denison Hotel parlors at noon on Tuesday, Aug. 19. The opening general session will be on Wednesday morning at the Capitol Building, when President Mendenhall will resign the chair to his successor, Professor Goodale. On Wednesday evening the retiring president will give his address in Plymouth Church. This will be followed by a reception of the association by the local committee and citizens at the Institute for the Blind. With the exception of Saturday and Sunday, the sections will hold morning and afternoon sessions until Tuesday evening, when the general closing session takes place. On Monday afternoon a special train will take the botanists to South Waveland. The Science Club, of Terre Haute, has invited Sections B, C, and D to hold their session at Terre Haute on Friday, where a visit will be made to the Rose Polytechnic Institute. The citizens of Lafayette have extended an invitation to Section F to visit Lafayette. The above invitations from Terre Haute and Lafayette will be accepted if approved by the council. On Wednesday a special excursion will be run to the Mammoth Cave. On Saturday an extensive trip will visit the gas territory of Indiana, and a visit will be made to the largest plate glass factory in the United States, and other concerns where natural gas is applied to manufacturing uses. For all matters pertaining to membership, papers, and business of the association, address the permanent secretary, Professor F. W. Putnam, until Aug. 15, Salem, Mass.; after Aug. 15 at the Denison Hotel, Indianapolis, Ind.

—A steam life-boat which recently made her trial trip in England is described by the London journals as being built of steel, with fifteen water-tight compartments. The boiler and engine rooms are brought up about three feet above the main deck, and are closed by iron covers to the man-holes, air being supplied by forced draught. The passengers' space is abaft the engines, seated all round, and will hold about thirty persons. The mode of propulsion adopted is a turbine, taking in water through the bottom of the boat at its apex, and discharging the water when it has attained its maximum velocity through tubular orifices on each side. About one ton of water per second is discharged. The speed at which the vessel ran on her trial trip was over eight knots. From full speed ahead the vessel can be stopped in thirty-two seconds, and way can be got on her again in four seconds. She carries a mast with some sail power forward, the mast being lowered when needful. The new life-boat is stationed at Harwich.

— If we follow the march of the vicissitudes of temperature, evidently determined by some cosmical agency, says *Nature*, we find at the beginning of Tertiary times a moderately warm climate; then a rise during the Eocene, and then a gradual cooling, interrupted possibly by some oscillations, down to a degree nearly corresponding to that now prevailing, at the beginning of the Pleistocene epoch. Then the cooling continued below the present temperature, to a minimum at the time of the greatest glaciation of the land; then a re-warming in the inter-glacial period nearly up to the present temperature; after which cold and glaciation regained the upper hand, finally to give way to the present conditions, which are about midway between the greatest warmth of the Tertiary age and the greatest cold of the Pleistocene. One fact stands out conspicuously, viz., that these changes progressed very irregularly, and were subject to much oscillation, and the period during which we can approximately follow the course of the change is much too short to enable us to learn the law that regulated it. We can not decide whether oscillations like those of the Pleistocene will be repeated, and we are now progressing towards another temporary Glacial period, or whether we have to expect the return to a warmer temperature such as prevailed in Tertiary times, or, finally, whether the outcome of all the deviations will be a lasting refrigeration of our climate. Just as little can we determine at present by what agency all these vicissitudes are brought about; most plausible and simple would it certainly be were the sun a variable star that at different periods emits different quantities of heat; but for this or any other assumption there is no proof forthcoming. This enigma, like so many others, will some day be solved by man's searching intelligence, but, like all other acquisitions of science, this goal can be won only by assiduous and patient labor. Haply the triumph may not be for our generation; but what we may certainly accomplish is to prepare the way to it, by an accurate and critical collection of the facts.

—In no other Scandinavian country is school education a State affair to the same degree as in Sweden, says a correspondent of the London *Journal of Education*. Not only are the higher secondary schools public, as in Norway and Denmark, but all primary schools are subject to public regulations and controlled by public functionaries, and the elementary teachers are appointed by the authorities. Likewise, the intermediate schools are nearly always public institutions, whose masters are civil servants, with all the duties and privileges resulting therefrom. In Norway, intermediate school education is in most places municipal, with State subvention, although the towns which have public secondary schools also have public intermediate schools; while in Denmark the intermediate schools are always municipal or private. The result of the Swedish system is that their schools are excellent, as the public appointment and the independent position of almost all the teachers greatly contribute to attract talented young