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**PRESERVED MEATS
AND MEAT-BISCUITS**

The many-headed public look out for 'nine days' wonders,' and speedily allow one wonder to obliterate the remembrance of that which preceded it. So it is with all newspaper topics, and so it has been in respect to the preserved-meat question. We all know how great was the excitement at the commencement of the present year on this matter. Ships' accounts overhauled; arctic stores re-examined; canisters opened and rejected; contracts inquired into; statements and counter-statements published; questionings of Admiralty officials in the two Houses of Parliament; reports published by committees; recommendations offered for future guidance; descriptions of the preserving processes at different establishments: all went the round of the newspapers, and then the topic was forgotten. It deserves to be held in remembrance, however, for the subject-matter is really important and valuable,

in respect not only to the stores for shipping, but to the provisioning of large or small bodies of men under various exceptional circumstances.

A few of the simple laws of organic chemistry suffice to account for the speedy decay of dead animal substances, and for the methods whereby this decay is retarded or prevented. In organised substances, the chemical atoms combine in a very complex but unstable way; several such atoms group together to form a proximate principle, such as gluten, albumen, fibrin, &c.; and several of these combine to form a complete organic substance. The chemical rank-and-file, so to speak, form a battalion, and two or more battalions form the chemical army. But it is a law in chemistry, that the more complex a substance becomes, the less stable is its constitution, or the sooner is it affected by disturbing influences. Hence organic substances are more readily decomposed than inorganic. How striking, for instance, are the changes easily wrought in a few grains of barley! They contain a kind of starch or fecula; this starch, in the process of malting, becomes converted into a kind of sugar; and from this malt-sugar or transformed starch, may be obtained ale or beer, gin or whisky, and vinegar, by various processes of fermenting and distilling. The complex substance breaks up through very slight causes, and the simple elements readjust themselves into new groupings. The same occurs in animal as in vegetable substances, but still more rapidly, as the former are more intricate in composition than the latter, and are held

together by a weaker tie.

What the 'vital principle' may be, neither chemists nor physiologists can tell us with any great degree of clearness; but it is this vital principle, whatever it may be, which prevents decay in a living organic substance, however complex. When life departs, the onslaught begins; the defender has been removed, and a number of assailants make their appearance. *Air, heat, and moisture* are the principal of these; they attack the dead organism, and gradually convert it into wholly different and inorganic compounds, such as water, carbonic acid, ammonia, phosphuretted hydrogen, and many others. What, then, would result if these disturbers could be warded off, one or all? It is now pretty well ascertained, that if any one of the three—air, heat, moisture—be absent, the decay is either greatly retarded or indefinitely postponed; and we shall find that in all antiseptic or preserving processes, the fundamental principle has simply such an object in view.

Sometimes the operation of natural causes leads to the preservation of dead animal substances for a great length of time, by excluding one out of the above three disturbing influences. If heat be so deficient that the animal juices become wholly frozen up, the substance is almost proof against decay. Thus, about seventy years ago, a huge animal was found imbedded in the ice in Siberia: from a comparison of its skeleton with those of existing species, Cuvier inferred that this animal must have been antediluvian; and yet, so completely had the cold prevented

putrefaction, that dogs willingly ate of the still existing flesh. At St Petersburg, when winter is approaching, the fish in the markets become almost like blocks of ice, so completely are they frozen; and in this state they will remain sound for a lengthened period. Dead poultry, and other articles of animal food, are similarly kept fresh throughout the winter in many rigorous climates, simply by the powerlessness of the attacking agents, when heat is not one of the number. And that which nature effects on a large scale, may reasonably be imitated by man on a more limited one. It is customary to pack many kinds of provisions in ice or snow, either for keeping them in storehouses, or for sending them to market. Thus it is with the tubs of poultry, of veal, and of other kinds of meat, which, killed in the country districts of Russia in autumn, are packed in snow to keep cool till sold at market; and thus it is with much of the salmon sent from Scotland to London. Since the supply of excellent ice from Wenham Lake, commenced about nineteen years ago, has become so abundant and so cheap, it is worth a thought whether the preservative powers of cold might not advantageously be made more available in this country than they have yet been. In the United States, housewives use very convenient refrigerators or ice-boxes, provided with perforated shelves, under which ice is set, and upon which various provisions are placed: a large uncooked joint of meat is sometimes kept in one of these boxes for weeks. Among the celebrities of the Crystal Palace, many will recollect Masters's elegant ice-making machine, in which, by combining chemical action with

centrifugal motion, ice can be made in a few minutes, let the heat of the weather be what it may. This machine, and the portable refrigerators manufactured by the Wenham Company, together with our familiar, old-fashioned ice-houses, might supply us with much more preservative power, in respect to articles of food, than we have hitherto practically adopted.

If, instead of watching the effects produced by abstraction of *heat*, we direct attention to the abstraction of *moisture*, we shall find that antiseptic or preservative results are easily obtainable. All kinds of bacon and smoked meats belong to the class here indicated. The watery particles are nearly or quite driven out from the meat, and thus one of the three decomposing agents is rendered of no effect. In some cases, the drying is not sufficient to produce the result, without the aid of the remarkable antiseptic properties of salt; because decomposition may commence before the moisture is quite expelled. In many parts of the country, hams are hung within a wide-spreading chimney, over or near a turf-fire, and where a free current of air, as well as a warm temperature, may act upon them; but the juices become dissipated by this rude process. Simple drying, without the addition of salt or any condiment, is perhaps more effectual with vegetable than with animal substances.

But it is under the third point of view that the preservative process is more important and interesting, inasmuch as it admits of a far more extensive application. We speak of the abstraction of *air*. Atmospheric air affects dead organic matter

chiefly through the agency of the oxygen which forms one of its constituents; and it is principally to insure the expulsion of oxygen that air is excluded. The examples which illustrate the resulting effects are numerous and varied. Eggs have been varnished so as to exclude air, and have retained the vital principle in the chick for years; and it is a familiar domestic practice, to butter the outside of eggs as a means of keeping them. The canisters of preserved provisions, however, are the most direct and valuable result of the antiseptic action by exclusion of air. The Exhibition Jury on Class 3, in their Report on this subject, speak thus warmly thereupon:—'It is impossible to overestimate the importance of these preparations. The invention of the process by which animal and vegetable food is preserved in a fresh and sweet state for an indefinite period, has only been applied practically during the last twenty-five years, and is intimately connected with the annals of arctic discovery. The active measures taken to discover a north-west passage, and to prosecute scientific research, in all but inaccessible regions, first created a demand for this sort of food; and the Admiralty stimulated the manufacturers to great perfection in the art. As soon as the value of these preparations in cold climates became generally admitted, their use was extended to hot ones, and for the sick on board ship under all circumstances. Hitherto they had been employed only as a substitute for salt beef or pork at sea, and if eaten on shore, it was at first as a curiosity merely. Their utility in hot climates, however, speedily became evident;

especially in India, where European families are scattered, and where, consequently, on the slaughter of a large animal, more is wasted than can be consumed by a family of the ordinary number.'

Whatever improvements may have been introduced by later manufacturers, the principle involved in the meat-preserving processes is nearly as M. Appert established it forty years ago. His plan consisted in removing the bones from the meat; boiling it to nearly as great a degree as if intended for immediate consumption; putting it into jars; filling up the jars completely with a broth or jelly prepared from portions of the same meat; corking the jars closely; incasing the corks with a luting formed of quicksilver and cheese; placing the corked jars in a boiler of cold water; boiling the water and its contents for an hour; and then allowing the cooling process to supervene very gradually.

Until the recent disclosures concerning the preserved meats in the government depôts, the extent of the manufacture, or rather preparation, was very little known to the general public. In the last week of 1851, an examination, consequent on certain suspicions which had been entertained, was commenced at the victualling establishment at Gosport. The canisters—for since Appert's time stone jars have been generally superseded by tin canisters—contain on an average about 10 pounds each; and out of 643 of these which were opened on the first day's examination, no fewer than 573 were condemned as being utterly unfit for food. On the next day, 734 were condemned out of 779; and

by the fourth day, the number examined had risen to 2707, of which only 197 were deemed fit for food. Such wretched offal had been packed in the canisters, instead of good meat, that the stench arising from the decomposing mass was most revolting; the examiners were compelled to use Sir William Burnett's disinfecting fluid abundantly, and even to suspend their labours for two or three days under fear of infection. The canisters formed part of a supply sent in by a contractor in November 1850, under a warrant that the contents would remain good for five years; the filling of the canisters was understood to have been effected at Galatz, in Moldavia, but the contractor was in England. The supply amounted to 6000 canisters, all of which had to be examined, and out of which only a few hundred were found to contain substances fit for food. Instead of good meat, or in addition to a small quantity of good meat, the examiners found lung, liver, heart, tongue, kidney, tendon, ligament, palate, fat, tallow, coagulated blood, and even a piece of leather—all in a state of such loathsome putridity as to render the office of the examiners a terrible one.

Of course nothing can be predicated from such atrocities as these against the wholesomeness of preserved food; they prove only the necessity of caution in making the government contracts, and in accepting the supplies. The Admiralty shewed, during subsequent discussions, that large supplies had been received from various quarters for several years, for use on shipboard in long voyages and on arctic expeditions; that these had turned

out well; and that the contractor who was disgraced in the present instance, was among those who had before fulfilled his contracts properly. Fortunately, there is no evidence that serious evil had resulted from the supply of the canisters to ships; the discovery was made in time to serve as a useful lesson in future to government officials and to unprincipled contractors.

The jury report before adverted to, points out how cheap and economical these preserved meats really are, from the circumstance, that all that is eatable is so well brought into use. It is affirmed by the manufacturers, that meat in this form supplies troops and ships with a cheaper animal diet than salt provisions, by avoiding the expense of casks, leakage, brine, bone, shrinkage, stowage, &c., which are all heavy items, and entail great waste and expenditure; and by a canister of the former being so much smaller than a cask of the latter, in the event of one bad piece of meat tainting the whole contents. The contents of all the cases, when opened, are found to have lost much of the freshness in taste and flavour peculiar to newly-killed meat; they are always soft, and eat as if overdone. As a matter of choice, therefore, few or no persons would prefer meat in this state to the ordinary unpacked and recently-cooked state. But the important fact to bear in mind is, that the nutritious principles are preserved; as nutriment, they are unexceptionable, and they are often pleasantly seasoned and flavoured.

In the ordinary processes of preparation, as carried on in London and other places, the tin canisters have a minute hole,

through which the air may be expelled, while the meat is simmering or boiling within; and in the case of poultry being preserved whole, extra precautions are necessary, to insure the expulsion of the air from the hollow bones of the birds. Soups are more easily prepared than solid meat, on account of the greater facility for getting rid of the confined air. The minute air-hole in the canister is soldered down when the process is completed.

M. Alexis Soyer, who has a notoriety in London as the prince of cooks, and a very ingenious man—a sort of Paxton of the kitchen—wrote to the daily journals, about the time of the disclosure at Gosport, to offer a few suggestions. He said: 'No canister ought to contain more than about six pounds of meat, the same to be very slightly seasoned with bay-salt, pepper, and aromatic herbs in powder, such as bay-thyme and bay-leaf, a small quantity of which would not be objectionable even for invalids. No jelly should be added to the meat; the meat, and the meat alone, should produce its own jelly. With the bones and trimmings of the above, a good *stock* should be made without vegetables, well reduced and skimmed, to form a very strong transparent demi-glaze; six-pound canisters should be filled with the same, bearing a special mark, and one of these allowed to every dozen of the others. This demi-glaze, when diluted in water, would make six gallons of very good broth, with which any kind of soup could be made in a very short time.' He also points out how the condition of the preserved meat may be guessed by the external appearance of the canister. If either the

top or bottom of the canister be convex, like the upper surface of a watch-glass, the contents are in a state of decomposition; the bulging being occasioned by the gases generated during the chemical changes. If the contents of the canister be sound, the top and bottom will be either quite flat, or slightly concave.

The Jury on Food, at the Great Exhibition, had quite an *embarras des richesses*; they were surrounded by hundreds of canisters of preserved provisions, all of which they were invited to open and taste. They say, or their reporter says, that the merits of the contributions 'were tested by a selection from each; the cases were opened in the presence of the jury, and tasted by themselves, and, where advisable, by associates. The majority are of English manufacture, especially the more substantial viands; France and Germany exhibiting chiefly made-dishes, game, and delicacies—of meat, fish, soups, and vegetables.' It is an important fact for our colonies, that viands of this description are as well prepared in Australia, Van Diemen's Land, Canada, and the Cape of Good Hope, as in the mother-country. 'Animal food is most abundant and cheap in some of those colonies. In Australia, especially, during seasons of drought, it is wasted in extraordinary quantities; flocks are slaughtered for the tallow alone, and herds, for their bones and hides. Were the meat on these occasions preserved, it cannot be doubted that it could be imported into England, and sold at a cheaper rate than fresh meat in our metropolitan markets, to the great benefit of the lower-classes.' This is a statement well worth being borne in mind

by some of those who are at present dazzled with gold-digging wonders.

In respect to the preserved meats at the Great Exhibition, many were merely cured or dried meats. From Canada, for instance, they comprised hams, bacon, tongues, and barrels of beef and pork. Among the miscellaneous contributions were grated beef, canisters of fresh salmon, 'admirable boiled mutton in tin cases,' dried mullets, '*mouton rôti*,' fish, meats preserved in a fresh state by simple drying—on a plan practised in Switzerland—and preserved larks. Not the least remarkable was a preserved pig, which reclined in all its glory on the floor of the south-west gallery, and was a successful example of curing on a large scale. Still more striking than this, was the large partridge-pie, placed somewhat out of general notice in the 'Netherlands' department; a formidable pie it truly was, for it contained 150 partridges, with truffles, and weighed 250 pounds: it had been made a year before it was forwarded to London. But among the contributions more immediately relating to our present subject, may be mentioned those of Mr Gamble, which comprised, among others, a canister of preserved boiled mutton, which had been prepared for the arctic expedition in 1824; many such canisters were landed at Fury Beach in Prince Regent's Inlet; they were found by Sir John Ross at that spot in 1833 in a perfect state, and again by Sir James Ross in 1849, the meat being as sweet and wholesome as when prepared a quarter of a century before.

The range of these preserving processes is singularly wide and

varied. If we take the trade-list of one of the manufacturers, such as that of Messrs Hogarth of Aberdeen, and glance through it, we shall find ample evidence of this. There are nearly twenty kinds of soups selling at about 2s. per quart-canister. There is the concentrated essence of beef, much more expensive, because containing the nutriment of so much more meat; and there are, for invalids, concentrated broths of intermediate price. There are about a dozen kinds of fish, some fresh and some dried. There are various kinds of poultry, roast and boiled; hare, roast and jugged; and venison, hashed and minced. There are beef, veal, and mutton, all dressed in various ways, and some having the requisite vegetables canistered with them, at prices varying from 10d. to 15d. per pound. There are tongues, hams, bacon, kidneys, tripe, and marrow; and there are cream, milk, and marmalade. Lastly, there are such vegetables as peas, beans, carrots, turnips, cabbage, and beet, at 6d. to 1s. per pound-canister. The canisters for all these various provisions contain from one pound to six pounds each. It was Messrs Hogarth, we believe, who supplied the preserved meats and vegetables to the arctic ships under Sir E. Belcher which sailed in the spring of 1852.

M. Brocchière, a French manufacturer, has lately extended these economical processes so far, as to attempt to produce concentrated food from the blood of cattle. He dries up the liquid or serous portions of the blood, and forms into a cake, with admixture of other substances, the coagulable portion, which contains fibrin, the source of flesh and muscle. Unless a more

delicate name could be given to this preparation, prejudice would have some influence in depriving it of the chance of fair play. The dry blood is in some cases combined with a small portion of flour, and made into light dry masses, like loaves or cakes, to be used as the basis of soups; while in other cases it is combined with sugar, to make sweet biscuits and bon-bons. Another kind of preserved animal fluid is the *ozmazome*, prepared by Messrs Warriner and Soyer. This consists of the nutritious matter or juice of meat, set free during the operation of boiling down fat for tallow in Australia; it is afterwards concentrated, and preserved in the form of sausages. A great amount of nutriment is thus obtained in a portable form; when boiled with gelatine, it forms a palatable diet, and it is also used to form a gravy for meat.

Masson's method of preserving vegetables seems to be very effective, as applied to white and red cabbages, turnips, Brussels sprouts, and such like. The process, as conducted in France, is very simple. The vegetables are dried at a certain temperature (104 to 118 degrees Fahrenheit), sufficient to expel the moisture without imparting a burnt taste; and in this operation they lose nearly seven-eighths of their original weight. The vegetables are then pressed forcibly into the form of cakes, and are kept in tinfoil till required for use. These vegetables require, when about to be eaten, rather more boiling than those in the ordinary state. Some of the French ships of war are supplied with them, much to the satisfaction of the crews. Dr Lindley has stated, on the authority of a distinguished officer in the antarctic expedition

under Sir James Ross, that although all the preserved meats used on that occasion were excellent, and there was not the slightest ground for any complaint of their quality, the crew became tired of the meat, but never of the vegetables. 'This should shew us,' says Dr Lindley, 'that it is not sufficient to supply ships' crews with preserved meats, but that they should be supplied with vegetables also, the means of doing which is now afforded.' Generally speaking, the flavour of preserved vegetables, whether prepared on Masson's or on any other process, is fresher than that of the meats—especially in the case of those which abound in the saccharine principle, as beet, carrot, turnips, &c. The more farinaceous vegetables, such as green peas, do not preserve so well.

One of the most remarkable, and perhaps valuable recent introductions, in respect to preserved food, is the American *meat-biscuit*, prepared by Mr Borden. A *biscuit-beef* is prepared by a Frenchman, M. Du Liscoet, resembling an ordinary coarse ship-biscuit; but this is said to have 'an animal, salt, and not very agreeable taste.' The American meat-biscuit, however, is prepared in a way which renders its qualities easily intelligible. It contains in a concentrated form all the nutriment of meat, combined with flour. The best wheaten flour is employed, with the nutriment of the best beef, and the result is presented for use as food in the form of a dry, inodorous, flat, brittle cake, which will keep when dry for an unlimited period. When required for use, it is dissolved in hot water, boiled, and seasoned at pleasure,

forming a soup about the consistence of sago. One pound of the biscuit contains the nutritive matter—fat excepted—of five pounds of prime beef, mixed with half a pound of wheaten flour. One ounce of the biscuit, grated and boiled in a pint of water, suffices to form the soup. It can also be used in puddings and sauces. The manufacture of the meat-biscuit is located at Galveston, in Texas, which abounds in excellent cattle at a very low price. It is said that the meat-biscuit is not liable to heating or moulding, like corn and flour, nor subject to be attacked by insects. The meat-biscuit was largely used by the United States' army during the Mexican campaign; the nutriment of 500 pounds of beef, with 70 pounds of flour, was packed in a twenty-two-gallon cask.

Dr Lindley, as one of the jurors for the Great Exhibition, and as a lecturer on the subject at the Society of Arts, commends the meat-biscuit in the very highest terms. 'I think I am justified in looking upon it,' he says, 'as one of the most important substances which this Exhibition has brought to our knowledge. When we consider that by this method, in such places as Buenos Ayres, animals which are there of little or no value, instead of being destroyed, as they often are, for their bones, may be boiled down and mixed with the flour which all such countries produce, and so converted into a substance of such durability that it may be preserved with the greatest ease, and sent to distant countries; it seems as if a new means of subsistence was actually offered to us. Take the Argentine Republic, take Australia, and consider

what they do with their meat there in times of drought, when they cannot get rid of it while it is fresh; they may boil it down, and mix the essence with flour—and we know they have the finest in the world—and so prepare a substance that can be preserved for times when food is not so plentiful, or sent to countries where it is always more difficult to procure food. Is not this a very great gain?' A pertinent question, which intelligent emigrants would do well to bear in mind.

THE BUYER OF SOULS:

A Russian Story

All over the world, the essential elements of human nature are the same. And it is very fortunate for me that they are so, else I should find myself in considerable difficulty in endeavouring to place before my readers a correct picture of the little, out-of-the-way town of Nikolsk. Making due allowances for the differences in national manners and customs; for Nikolsk being under the dominion of his autocratic majesty the emperor of all the Russias, instead of the mild, constitutional government of Queen Victoria, there is no great discrepancy between Nikolsk and any equally out-of-the-way town in England. It has the same dearth of excitement, the same monotonous uniformity of life; it lives in the same profound ignorance of the great incidents that the drama of human existence is developing on the theatre of the world at large; it has its priest, its doctor, its lawyer, its post-office where a seal is not so sacred as it might be, or rather where the problem of getting at the news, without breaking the wax, has been successfully solved; it has the same thirst for scandal, the same intense interest for the most contemptible trivialities, the same constantly impending danger of suicide from ennui, did not human nature adapt itself to its environments, and sink

into pettiness as naturally as though there were no such things as towns and cities, and enlarged views of man and nature in the world: all these it has the same as any British Little Pedlington. Then it has its circles of social intercourse, as rigidly defined and as intensely venerated as the rules of court precedence. The difference in the social scale between a landowner, a tenant, a member of the professions, a tradesman, a publican, a sweep, and a beggar, is accurately prescribed and religiously observed—with this addition, however, that in Nikolsk the owners of land are also owners of the serfs upon the land, and that the numerous representatives of that most centralised of all governments cut an important figure in the snobberies of the place. In fine, there is one little English word that describes Nikolsk completely, and that is—*dull*. It is dull—beyond comprehension dull. No town in the universe can be duller; because, from its quintessential dulness, there is but one step to total inanition.

Thus, in Nikolsk, the ancient saying, that there is nothing new under the sun, was daily and hourly verified. Week after week, and year after year, the governor pillaged the people; the inspector of charities pillaged the charities; the inspector of nuisances sedulously avoided inspecting at all, lest, by removing them, the need for his services should cease; the landowner ground down the serfs; the tax-assessor ground the landowners; and everybody, in return for the favours a paternal government showered upon them through its immaculate representatives, cheated and defrauded that government with a persistency and

perseverance approaching the sublime. Mothers of daughters were in despair, for in Nikolsk there were no 'nice young men,' no eligible matches; fathers of sons despaired in their turn, for as everybody robbed everybody, and the government robbed the robbers, there were no heiresses; ladies wore the fashions of 1820 in 1840, under the impression that they were the newest from Paris; the reading portion of the community were just beginning to hear of Voltaire as a promising writer; and the general public laboured under the fixed idea, that somewhere or other Napoleon was still prosecuting his leviathan campaigns, happily *not*

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