"But what about fame? For I take it you intend to become an artist, and fame means a life's work."

"I never thought about fame," I answered dubiously.

"What is a man without ambition?" she returned dreamily, the beautiful dark eyes fixed on the blue sky. All at once she seemed far, far away from me, for I felt I was an idle schoolboy, a good-for-nothing without ambition.

"Were you ever in love?" my lady asked, pursuing her catechism and laughing at me roguishly.

"Never till now," I returned, growing cheerful again and even bold in the light of her smile.

For one moment she looked at me severely, then laughed again.

"*Quelle audace!*" she said. "Do you know that you saw me yesterday for the first time?"

"Ah, but there was an eternity between night and morning!"

"Who taught you to say pretty things?" she asked disdainfully. "You are as bad as an old courtier."

"I do not know that they are pretty," said I dolefully, cast down because I had not pleased her; "but they are true."

She looked at me steadily, then held out her hand.

"We will be good friends, then. Come, smile and look happy, for I do not love a glum visage. And now let us go for a walk together."

(*To be continued.*)

TINNED FOODS.

THERE is no application of science which has progressed at such a rate as the preservation of food, so as to enable it to be kept for a considerable time in a fresh and palatable condition.

It is not so very long ago that the only way of preserving meat consisted in steeping it in concentrated brine. This method was open to many objections. Those of you who have sampled fine old junk will readily agree with us that meat so preserved might ward off starvation and certainly would not encourage gourmandising. But it is not fit for human food; it is neither palatable nor wholesome, and all must be thankful that it is now superseded by newer methods.

The change from coarse beef preserved in brine to delicately flavoured entrées preserved in tins, is a very great one. And the processes by which the former has been replaced by the latter have been long and gradual, and are undoubtedly one of the most valuable outcomes of the science of the nineteenth century.

We owe it all to science, and to the most complicated and highly-developed science. You would scarcely credit what a vast deal of learning and abstruse theory and experiment was needed to perfect the canning and preservation of meat.

It is not the man who has invented a patent tin or cork or bottle that we must honour as the inventor of the process of the preservation of perishable material. It is the great physicists and chemists and bacteriologists of the last two decades of the century that is past that we must thank for what is one of the greatest boons which we possess.

Most Englishmen look upon science with indifference if not with contempt, and the great discoveries which have been made during the last century have been passed over as matters of theoretical interest only.

When Faraday discovered the connection between electricity and magnetism, he received but scant credit for his discovery, which was looked upon as one of philosophical interest only and one in which there was "no money." And yet if we consider this discovery from a purely mercenary view only, we must look upon it as the most practical discovery of physics. For the whole of the use of electricity depends upon this discovery, and to it we owe the debt of all the electrical contrivances which are now indispensable to the progress of civilisation.

And throughout the history of the application of science, we find this: that everything that brings great fruits to the world at large is based upon the theoretical discovery of the laboratory. It is not the so-called practical scientist who gives growth to practical discoveries; he merely sucks the brains of those who unravel the secrets of nature for the sake of the advancement of knowledge alone.

The processes of preserving and tinning meats are examples of the way in which those who apply knowledge on a commercial scale obtain not only all the profits but also the honours which are due to the minds of those who first laid bare the principles of the science upon which the practice is based.

There have been many steps in the perfection of the process of tinning meat, and very many unforeseen difficulties arose, most of which were overcome by investigation and experiment, but some of which remain to this day unconquered.

Food is kept in a fresh condition by preventing it from decomposing. And the germs of putrefaction are present everywhere. The first element in the preservation of food is to render it sterile and to keep it in a sterile condition. Many methods have been adopted whereby this end may be gained; but there is no process which is quite applicable to all foods.

The most common and the most accurate way of sterilising food is to boil it. Prolonged boiling will kill all known germs, and so the food which we normally eat is in an absolutely sterile condition when it is taken from the pot or oven. But in its transit from the kitchen to the dining-room, it may become infected by germs, and though this is usually unimportant if the meat is eaten at once, it becomes of considerable moment when it is to be kept for months or years.

When canning or potting meat, it is exceedingly difficult, if not impossible, to be certain that the contents of the tin are absolutely free from organisms when the lid is soldered down. The manufacturer can be certain that extremely few organisms have entered his ware, but he knows that there is always a possibility that there may be a few.

The entrance of organisims into a tin of meat will not necessarily do any harm to the contents. They may find the position unsuitable to them, in which case they will die and the meat will become sterile and remain so for years, if not for ever. But usually the germs remain dormant for a time, and then, for some unknown reason, start growing and vitiate the contents of the tins.

As a practical point it may be stated that no tins of meat can be trusted to remain fresh for more than about a year, so that when you buy tins of meat be sure to get fresh ones. You will find, as a general rule, that the freshness of the tins is in direct proportion to the price you pay for them, and the difference between first and second quality tins is mainly that the former are fresher.

You have all heard of "blown tins," or tins the contents of which have become decomposed with the evolution of gas which blows out the lids of the tins. Not all forms of putrefaction result in the development of gas. Tins of condensed milk more frequently become "blown" than any others. It is scarcely necessary for us to add that the contents of any tins which have become "blown" are absolutely unfit for human consumption. It is illegal to sell "blown" tins, yet, as a matter of fact, very many are sold to the poor by unscrupulous hawkers. But now the

offence is one which is so severely punished that it is gradually getting less common.

Talking about "blown" tins, it is well to remind you that you can tell nothing by the number of soldered holes in the lids of the tins. It is not true that holes are made in tins to let out gas developed by putrefaction. You may find identical holes in tins of provisions which are absolutely sterile and which have never been tampered with.

Far more important than the ordinary putrefactive changes is a degeneration which may occur in tins, whereby animal alkaloids—most virulent poisons—are developed from the albumen of the tinned foods. And at present there is no way known to us by which this can be prevented, or even discovered, except by the action of the poison on those who have partaken of the contents of the tins.

This subject of the development of animal alkaloids is undoubtedly the most important matter to be attended to at the present time. The whole thing is so mysterious, so inexplicable and so desperate, that scarcely any point in sanitary science is of equal moment.

What causes the change? We do not know. and though we may attempt to explain it by analogy, we are unable to prove our point. It *seems* most probable that the agents which cause this change are living organisms, for very similar changes occur in many substances from the effect of putrefaction which is known to be due to organisms. But no germ has been demonstrated in this instance, and it is not easy to see how the germs enter the tins. or, having entered them, escape destruction by the means which destroy the ordinary germs of putrefaction.

Animal alkaloids may develop in all kinds of provisions, no matter how they are preserved or for how long they are kept. It is perhaps less common in meats that are tinned than in such as are preserved in bottles, or in jars, or in skins.

Each kind of food undergoes a form of degeneration which is special to it, and which differs more or less from the changes which occur in other substances.

Although very similar in action and in chemical composition, these alkaloids vary immensely in their potency. The most virulent kinds have been found in tinned sardines, salmon, hams and German sausages. That found in sardines is the most fatal of all; and a quantity, which we are unable to estimate by any means that we possess, is sufficient to kill an adult.

It is unfortunate that we have no means of telling whether or not the contents of a tin or jar of provisions have undergone this form of decomposition. The viands may taste perfectly good, and there is rarely anything suspicious either in the smell or appearance of the poisoned food.

It is said that these changes do not occur in tinned foods which are perfectly fresh, and that the longer the tins are kept the greater is the chance of their being poisonous, and this is undoubtedly correct. But we cannot fix a limit to the time that the food is fit for consumption, and say that such a tin of provisions will not be safe after being kept for so many weeks or months. And the converse to this is also true, and is very much more important. It is impossible to be absolutely certain that provisions are not poisonous even when they have been kept for but a few days.

Undoubtedly the greater use of tins in place of pots and glasses and bottles has done an immense deal in limiting the number of cases of so-called "ptomaine poisoning," for of all preserved provisions those that are kept in tins are the least likely to be poisoned by these animal alkaloids.

The danger of "ptomaine poisoning" is not very great; but it is absolutely unpreventable at present, for we possess no power of neutralising or destroying the alkaloids. Boiling, which kills all organisms and renders food incapable of spreading disease, has no effect upon the alkaloids. It is a danger we all have to face and to which we must all be resigned; nor should it be argued that the fear of calamity should deter us from eating preserved provisions, for the benefits which we all derive from them far outweigh the occasional debt which one of us may have to pay for them.

In former times, before the process of tinning had been perfected, there was a danger of tinned foods becoming contaminated by the metal used in the tins and solder, and, though that danger is now minimised, we cannot yet say that it no longer exists.

Cases of poisoning by tin, lead, zinc and arsenic have occurred from eating tinned meats; but they are not common nowadays, and add but little to the number of deaths from preserved foods. Unlike what we have called alkaloidal degeneration, tinned fruits are far more likely than tinned meats to become poisoned by dissolved metals. Tinned Morella cherries have been especially guilty in this respect; but any acid fruit or vegetable is liable to become contaminated with the metals of the tin or solder. It is for this reason that acid fruits are better preserved in bottles than in tins. With care and increased experience it will soon be possible to completely overcome the dangers of foods being poisoned by their tins.

There is yet a fourth way by which preserved foods may become poisonous, and that is by the introduction into them of chemical substances for the purpose of keeping the goods free from putrefactive germs. The two drugs that are used to prevent putrefaction are boracic acid and salicylic acid. Neither of these is very poisonous, and personally we greatly question whether their employment in moderate quantities would have the slightest deleterious effect upon persons consuming the provisions. The small amount of boracic acid which is introduced into butter or margarine to prevent it from becoming rank is not sufficient to do any injury to the human body, and from the point of view of health it is distinctly better to employ a chemical preservative than to run the risk of the provisions undergoing putrefactive changes.

The tin is the nearest approach to an ideal method of preserving food. In every way—except in the possibility of the contents becoming poisoned by metals—the tin has the advantage over jars and pots and glasses and bottles and every other receptacle in which food can be stored. The tin has disadvantages, it has dangers, but these are being gradually wiped out as science progresses.

If we compare preserved foods of any kind with fresh food, we must admit that the former lacks much which is possessed by the latter, and that at present it is impossible for us to preserve food in a perfect manner; but here again we are steadily progressing, and we know not what the future may bring us.

When using preserved foods give attention to the following details and you will run but little risk of danger:—

First. Always pay a fair price for your article and obtain your provisions as fresh as possible. Avoid buying second quality tins to save a halfpenny or so.

Second. Always obtain your provisions in tins rather than in any other receptacle, with the exception of acid fruits and tomatoes, which are better in bottles.

Third. When you have opened a tin of provisions eat them at once, and do not keep them longer than you can help, for preserved foods rapidly decompose when exposed to the air.