

set up here, and which is driven by several powerful steam engines, is calculated to withdraw heat from the objects under observation, and to maintain them at a temperature between -20 and -200° C. as long as may be required. For this purpose, among the refrigerating processes known, such as the rarefaction of gases, dissolution of salts, and evaporation of liquids, the latter is to be preferred. The liquid made use of in the first stage of the refrigerating process is the mixture of sulphurous acid and a small percentage of carbonic acid termed "liquide Pictet." It is condensed at a pressure of about two atmospheres in a spiral tube, merely cooled by running water. For the second stage oxide of nitrogen (N_2O) is chosen. The vapours are condensed in the same way at a pressure of about five or six times as great in a tube maintained at about -80° by the action of the first circuit or spiral. Atmospheric air, which is employed in the third stage, passes into the liquid state at a pressure of no more than seventy-five atmospheres, provided the condenser is kept at -135° C. by the first two circuits. The evaporation of the liquefied air causes the thermometer to fall below -200° . It is probable that the definition of certain laws will have to undergo considerable modification with regard to changes at an extremely low temperature. For example, radiation under ordinary conditions of temperature is very different from that taking place at extremely low temperatures, in spite of the precautions that may be adopted. Material that is ordinarily considered a non-conductor of heat does not appear to affect the passage of heat into a body cooled down to below -100° . As Professor Pictet holds, "the slow oscillations of matter which constitute the lowest degrees of heat pass more readily through the obstruction of a so-called non-conductor than those corresponding to a higher temperature, just as the less intense undulations of the red light are better able to penetrate clouds of dust or vapour than those of the blue." If the natural rise of temperature in the refrigerator, starting from -135° C., is noted in a tracing, and afterwards the same refrigerator carefully packed in a covering of cotton-wool of more than half a yard in thickness, and cooled down afresh, and the rise of temperature again marked, on comparing the tracings hardly any difference will be found in the two curves up to -100° , and only a very slight deviation even up to -50° . On this ground it is probable that the utmost limit of cold that can possibly be attained is not much lower than that reached in the famous experiment of liquefaction of hydrogen. The quantity of warmth which hourly floods a cylinder 1250 mm. high by 210 mm. wide, at -80° , is no less than 600 calories, and no packing will keep it out. At lower temperatures, the radiation being even greater, the power of machinery intended to draw off still more heat would have to be enormous, and as -273° is absolute zero, the utmost Professor Pictet judges to be attainable is about -255° .

The results that have been accomplished by employing such a powerful refrigerating machine as that which Prof. Pictet has recently constructed are, it will be admitted, surprising. The elasticity of mercury has, for example, been measured. For this purpose the metal was cast into the shape of a tuning-fork, and frozen hard enough to make the necessary observations. It is stated that the metal can be shown in the crystallised state, and the crystals exhibit a beautiful, fern-like appearance. Glycerine was successfully crystallised, and cognac when thawing was found to possess that peculiar mellowness characteristic of a long-kept spirit. Of paramount importance, however, are the results obtained on freezing chloroform. It is well-known that chloroform, owing possibly to the mere traces of impurities retained from the different processes of manufacture, has been considered a most unstable and easily contaminated substance. The action of sunlight in particular has been to set up more or less marked decomposition, and accordingly a minute amount of alcohol is added to the chloroform of the Pharmacopœia in order to render it stable. Now, by the simple process of crystallisation—a process so often employed in chemistry to separate the pure from the crude product—this unstableness is got rid of, and a practically unchangeable liquid, it is stated, is produced. The crystals began to form at -68° C, first covering the bottom of the vessel and gradually filling it up to within one-fifth of the whole volume. The residue is drawn off, and the frozen part is allowed to melt under cover. Chloroform thus refined showed no signs of decomposition, even when exposed on a roof in a light-brown bottle from November till June. The importance of this discovery is yet to be seen, and medical

men will await with the keenest interest the results of the anæsthetic employment of this pure product, for it would indeed mark a most important epoch in medicine if it were found that the action of chloroform so refined were more certain and more reliable. Then the varying effects of the preparation hitherto used, which have so long puzzled administrators, would at length receive explanation. Purification by refrigeration and subsequent separation of the unsophisticated product will no doubt apply in the case of many other bodies. Ether, for example, has by a similar process been prepared in a state of purity hitherto unattained. Meanwhile it is interesting to be assured that Professor Pictet continues eagerly to pursue his purely scientific investigations, which in their commencement decided forever that it is only physical conditions like temperature and pressure which determine as to whether matter shall be solid, liquid, or gaseous.

LIFE ASSURANCE AND THE MEDICAL PROFESSION.

THE pressure of matter relating to this topic in our impression of last week, involving as it did the dedication of an additional page to the purposes of a Supplement which was intended to extend only to eight pages, compelled us then to hold over the correspondence elicited by an annotation which appeared in THE LANCET of the 17th ult. To our correspondents collectively we now return our thanks for their very valuable communications, which have been prepared in many cases at no small personal cost of trouble. Their letters are too numerous for publication or individual notice; but the general effect may without much difficulty be stated within the compass of a short article.

The most formidable difficulty in the way of a medical man who wishes to insure his life and to effect his insurance with the office which will offer him the best return is the perplexity into which he falls when he comes to compare the statements put forward by the different offices, by reason of their differing so widely as to the ground which they take up. We have for example a very full and circumstantial narrative from one of our correspondents, who recently took the pains to obtain quotations of a premium rate for a contemplated policy from eleven different offices. When he compared the rates he found them range from a little over £57 to a little above £62 for an assurance of £1000, and he would doubtless have found, if he could have made the comparison, that the range of variation in bonus-giving power would have been more striking still. But when he attempted to work out the bonus-comparison he found himself presented with a problem of such extreme complexity that he was compelled to abandon the attempt. Every office has its own particular way of distributing bonus, and nothing but an actuarial calculation can determine how much in the shape of, say, addition to the sum assured is equivalent to an abatement of £1 from an annual premium. It would be perfectly easy for the companies, were they interested in making this matter plain, to reduce all their bonus allotments to the common expression of a cash equivalent. It would then be a simple matter to compare the bonus-giving power of one office with that of another, for the form in which the bonus is given, whether by reversionary addition to the benefit or present reduction of the premium under a policy, is the merest matter of detail. This, however, is precisely what the offices do not attempt at the present time, and as such clear and easily intelligible statements could not advance the business interests of such as would compare at disadvantage, it must obviously be the interest of all the offices but one to maintain the existing obscurity. Little, therefore, can be expected in this direction, and our correspondent took what we think is the undoubtedly wise course, and, in abandoning a hopeless inquiry, selected the office which on the available data offered the best result.

Another point to which attention is strongly drawn in our correspondence is the importance of early insurance. Young men are apt to set light store by a matter of this kind, and to delay effecting assurance until the necessity becomes pressing. In a measure this is reasonable enough, for, speaking generally, a man's means are proportioned to his

responsibilities, and it is not in the power of young, unmarried men, as a rule, to maintain the amount of insurance which, a little later on in life, is not only demanded by their circumstances, but also well within their compass. This, however, does not invalidate the contention that young men should be encouraged to look ahead, and, by the exercise of a wise forethought and prudent self-denial, lighten the burden of the later years, which, even in the case of a fairly prosperous practitioner, are full enough of pecuniary demands.

A point upon which some needless apprehension appears to exist is that of the ordeal of medical selection. It is indeed a little strange to find this a source of trouble to our readers, for although medical practitioners cannot by any means claim immunity in this particular from "the ills that flesh is heir to," they might reasonably be expected to take a calmer view than some other people of the medical examination. One of our correspondents is troubled as to the proportion of proposed lives which are either declined or subjected to special rates as unsafe risks. The figures which would illustrate this point we have not at hand, nor indeed are we aware that they exist, unless possibly in a fragmentary form in the shape of chance references here and there in the annual report of one company or another. But we understand that the number so declined or charged a special premium is no considerable proportion of the whole, and that the life assurance definition of a first-class life is sufficiently elastic to include almost all men in good health and organically sound.

Other suggestions which have reached us relate very much to the topic which formed the special subject of our Supplement last year—namely, the form of policy which is best adapted to the needs of the medical practitioner. These suggestions have not been overlooked, although the course which the discussion has taken on this occasion has not permitted us to treat them in any sense fully. Our correspondents will, we hope, understand that in dealing with a large subject like this we are obliged to treat it in chapters, so to speak, and although it is not at all congenial to pass over an intrinsically valuable communication on the ground merely that it does not fit precisely into our programme, considerations of time and space, if no others, would alone constrain us to adhere, and to adhere even rigidly to this rule.

There is one point upon which some misunderstanding appears to have arisen, and we must therefore make an opportunity of referring to it again—namely, that of the arrangements by which it is possible to secure policies with certain offices commission free. We published in our Supplement a list of such offices—a list which, by the way, was incomplete in consequence of the inadvertent omission of the name of the London Life Association. In that list an explanatory sentence indicates that some will and some will not pay commission, and it seems to have been supposed that between those that will pay and those that will not pay there must be a great difference. Apart from further explanation this view would be reasonable enough, but we hoped that the further explanation had been clearly given. It is this: Some life offices make it a rule to pay no commission to any person upon premiums—that is to say, they employ no commission-paid agents at all. It follows that all policies effected with these offices are commission free, and this is what is meant to be intimated by including in the following table, now republished with the correction above indicated, certain offices as offices which *pay no commission*. The remaining offices make a practice of paying commission to their own agents on business received or transacted through the agents' intervention. Of these remaining offices, some have agreed to make to a medical man coming to effect an assurance without the intervention of an agent an allowance equal to the agent's commission. In these cases, therefore, a medical man can, if he likes, get his policy commission free, just as with an office of the first-mentioned class. In the result, therefore, it comes to the same thing, and the note which is appended to the entry of the company's name serves only to intimate whether the commission is dealt with by refusing it to anybody, and applying the money that would otherwise be spent on agency commission to the increase of bonus benefits, or by consenting to pay it to the medical proposer, and so enabling him either to add it to his policy in the shape of an enlarged assurance or to receive the benefit of it at once in the shape of a diminished premium.

List of offices which either pay no commission on premiums or offer the benefit of the commission to a medical practitioner effecting a policy without the intervention of a commission-paid agent:—

ALLIANCE will pay commission.
 BRITISH EQUITABLE will pay commission.
 CHURCH OF ENGLAND will pay commission.
 CLERGY MUTUAL pays no commission.
 COMMERCIAL UNION will pay commission to a medical practitioner willing to accept a "private agency."
 EAGLE will pay commission.
 EQUITABLE SOCIETY pays no commission.
 LONDON LIFE ASSOCIATION pays no commission.
 METROPOLITAN pays no commission.
 NATIONAL of Ireland will pay commission.
 NORWICH UNION will pay commission.
 PATRIOTIC will pay commission.
 PELICAN will pay commission.
 POSITIVE will pay commission.
 RELIANCE will pay commission.
 UNIVERSITY will pay commission.
 YORKSHIRE will pay commission.
 IMPERIAL and SCOTTISH EQUITABLE would pay commission to a medical committee or central body.

TEA-TIPPLING.

TEA-DRINKING has recently been the subject of discussion and correspondence in some of our contemporaries, and while some of those who have taken part in the discussion are inclined to ridicule the idea that the habit is injurious, and to treat such a view as the product of an over-anxious imagination, it will be evident to anyone who has paid attention to the subject—and we venture to think that medical men have not been slow to take advantage of their peculiar opportunities for doing so—that it cannot be dismissed with an expression of belief that "tea-drinking has not diminished the native grace and dignity of Englishwomen, and that envy, malice, and all uncharitableness are much more conducive to indigestion than five o'clock tea." That a cup of good tea properly made is for the majority of people both wholesome and refreshing will be admitted by all; but to admit so much is very different from asserting that tea, in the quantity and of the quality in which it is too often partaken by many people, especially women, is a harmless and pleasant beverage. We do not think that men err much in this way. Possibly they betake themselves to more potent if also more harmful liquors, but no one who has seen much of the out-patient departments of our large hospitals can have failed to be struck with the numbers of anæmic and dyspeptic women and white-faced puny children, in whom inquiry elicits the history of indulgence in tea not once but many times a day. This habit is doubtless most prevalent amongst the very poor and is perhaps the result of their poverty. The morning teapot remains "on the hob," food is perhaps scarce, the teapot is handy, and its contents, becoming hourly more poisonous, temporarily satisfy, or at least ward off, hunger. But indulgence in this habit—if we had to do with alcohol, it would be called a vice, and perhaps that term would be the more correct one—produces results almost as serious if not quite so obvious as those which the stronger liquid excites. It produces disinclination for solid food, dyspepsia, and consequent anæmia, and these bring in their train nervousness, depression, and even melancholia. A few weeks ago we referred to the case of a poor woman who was charged with the murder of her two children. From certain writing found in her possession it was evident that she had intended to perish with her children, believing that they were hopelessly ill, and that she herself was slighted by her friends and neighbours. She had suffered from headaches, palpitation, and sleeplessness, and it was found that she had been in the habit of taking large quantities of tea in consequence, as she said, of her troubles, and the divisional surgeon who saw her was of opinion that excessive indulgence in tea had helped to undermine her constitution. Doubtless this is an extreme case, and although it would not be permissible to ascribe the melancholia to excessive tea-drinking, it is