tinguished from lymphoid tissue, are of themselves capable of showing all the changes incident to scrofula. The capsular plexus in glands is well isolated between the two layers of the capsule; it represents a tissue composed solely of lymph-vessels well marked off from surrounding parts, yet this tissue can show all the changes incident to struma, the large cell-elements, the giant-cells, the tubercle so-called, and the caseous termination.

In conclusion, I will draw attention to certain practical points, illustrated by the pathology of these affections. It has been stated that, in the earlier stages of the process, the gland is crowded with lymphoid corpuscles; often many glands are affected in this manner, and under such circumstances one would expect that some, at least, of these cell elements would enter the general circulation by the efferent vessels, and produce a state of leucocythæmia. But opposed to such a supposition is the fact, that an anæmic appearance is not commonly observed in these affections, not even in the earlier stages, and a reference to the glands themselves explains the reason of this. The medulla is the part first affected: and the medullary sinuses, whence the efferent vessels are derived, are therefore soon blocked and rendered practically impervious. At the same time, sections made through the hilus show that the efferent vessels, instead of being crowded with lymph-corpuscles on their way to the general circulation, are absolutely deficient in those elements. They contain merely a little coagulum, a small cluster of corpuscles here and there, and nothing more. One must assume, therefore, that the early compression of the sinuses is instrumental in preventing an increase in the white elements of the blood. This condition is in strong contrast to that observed in the glands in lymphadenoma. In such organs, no attempt appears to be made to prevent the escape of the rapidly proliferating elements, and the vessels at the hilus are seen to be actually crowded with leucocytes on their way to enter the circulation of the blood.

The question as to the mode of extension of this disease of glands in scrofula touches very pointedly upon the value of operative interference in certain cases, and receives excellent answer in the pathology of the process.

There is no doubt that, from some one peripheral irritation in a mucous membrane, many glands may be simultaneously affected, or at least involved in rapid succession; but in addition to this mode of increase, I would draw attention to the fact, that glands already attacked have the power of conveying the disease to others in the vicinity, by a process of local infection. One constantly meets with cases where glands are involved, one after the other, in a very regular succession, and in a direction often actually the reverse to that of the lymph-current. From some definite peripheral irritation a gland may enlarge just above the clavicle, and be followed, in the absence of any fresh irritation, by a series of glands that will appear in order one after the other, and mount up the neck, the last gland affected being that nearest the jaw. In such a case, it may be urged that the circulation of lymph is so interfered with by the implication of the original gland, that a species of backward stasis is produced and the diseased lymph thrown thereby into collateral channels. In the same way, it is very common to see gland-mischief extend from the neck into the axilla, in a most precise order, and by direct continuity of parts.

The microscope, however, reveals another explanation; the diseased process may actually be followed from the gland-tissue back into the capsular plexus, and thence into the afferent vessels: these latter become blocked up by the corpuscular elements, develop within their lumen a reticulum, just as observed by Klein in inflamed lymphatics elsewhere, undergo all the scrofulous changes, and become in time caseous. I imagine that, by means of these vessels, connected glands may be affected, especially as one finds connecting lines of diseased tissue running from one gland to another. Moreover, this morbid change can extend along the vessels, independently of valves and in the reverse direction to the lymph current.

Then, again, it is well known that the larger glandular masses may present more separate gland-bodies than can be accounted for by the anatomists. Many of these are no doubt due to the enlargement of glands so small in health as to escape the eye of the dissector. And again, I have repeatedly found little glands wholly caseous, which are yet no larger than hemp-seeds. Now, I believe that many of these apparently supernumerary bodies are produced from the afferent lymphatics of the adjacent diseased glands by the following process. Klein has shown that irritated lymphatic vessels very readily develop into masses of adenoid tissue surrounded by a perfect sinus, which sinus is nothing indeed but the altered vessel itself. These little masses may assume the features of a gland, although they retain a much more rudimentary structure, are quite capable of increasing indefinitely, of showing the whole of the changes incident to scrofula; and I have no doubt that they form, in time, many of the bodies that are not to be distinguished

from the ordinary lymph-glands. These points would strongly support the early removal of glands in certain situations and in certain subjects, especially the more chronic forms which are the most inclined to extend on the one hand, and the most easy to remove on the other; but in any case the mischief should be recent, the nature of the affection undoubted, and the glands involved few and well isolated.

There is another mode of treatment—namely, that of scooping out the interior of the gland through a small incision—that is even more restricted in its application; and I think that the needful restrictions are clearly indicated by the pathology of the disease. Such a proceeding could only be applied to glands that are advanced in disease, and that are either very caseous or have partly suppurated. It is most applicable to those glands referred to as of the second variety; for in their latter stages these glands become very adherent to the adjacent parts, their contents become soft on the one hand, and their capsule very dense and thick on the other. These three conditions being present, a good prospect is afforded for the success of this method. But in some of the less intense forms, and again some of the most chronic forms, before suppuration has been induced, such a plan would be attended by much risk, for these glands are often very movable, have formed few adhesions and possess moreover a very thin capsule.

In conclusion, I should imagine that much can be done by operative measures to lessen the duration and to modify the subsequent ill effects of these gland-diseases; but there can scarcely be a disorder where such procedures require more care in their application, and more restrictions in the selecting of proper cases, than does the affection to which I have now had the honour of drawing your attention.

ON THE USE OF STEAM IN THE SICK-ROOM FOR INCREASING THE ATMOSPHERIC HUMIDITY.

By WILLIAM MARCET, M.D., F.R.S.,

Late Senior Assistant-Physician to the Hospital for Consumption and Diseases of the Chest, Brompton; and to the Westminster Hospital; etc.

It is now fully admitted that the atmospheric conditions most beneficial in pulmonary congestion, bronchial irritation, and many other affections, are warmth and humidity. Unfortunately, the temperature required indoors cannot be attained without a considerable accession of atmospheric dryness; and this we endeavour to counteract by steaming the air.

On January 20th of the present year, with a temperature of 32° out of doors on my dining-room window-sill in Grosvenor Street, the wet bulb reading gave 65 per cent. of moisture, while in that room, with a temperature of 53°, the atmospheric humidity registered only 55 per cent. On the 22nd, the temperature out of doors was 27.5°, and relative humidity 90 per cent.; indoors temperature 49°, relative humidity only 57 per cent. On the 23rd, humidity out of doors 76 per cent.; indoors 60 per cent. It is, therefore, very obvious that, on cold days, the relative humidity in warm rooms falls to a very low figure; and, in cold and wet weather, the humidity indoors will be much below what it registers in the open air.

The usual way of imparting dampness to the air in a room is to keep water boiling with a spirit-lamp, or generate steam from the common bronchitis-kettle placed on the fire. Thus volumes of vapour are emitted, often giving an erroneous impression that the air is becoming dampened to a considerable extent. In a small room, holding only 1,454 cubic feet of air, with double doors shut, and no other ventilation than that going on through the chinks of an indifferently fitting window, I have obtained with the usual bronchitis-kettle an increase of relative humidity amounting in one case to from 57 to 67 per cent., or by 10 per cent. with an open-air temperature of 40° and 96 per cent. of humidity, which were favourable conditions towards the artificial addition of moisture. On another occasion, the increase was from 61 to 71 per cent.—again 10 per cent.—with 41° out of doors and 88 per cent. of relative humidity: again a favourable condition towards the dampening influence of steam. In a third instance, the increase was from 59 to 64.4 per cent., or by 5.4 per cent.; open-air temperature 43°, and 85 per cent. of relative humidity; the circumstances being in this case rather less favourable towards the influence of steam as increasing the atmospheric humidity.

In the first of these experiments, the steam was emitted for one hour, during which time two pints and eight ounces of water were evaporated out of three pints from a common bronchitis-kettle placed on the fire. In the second, two pints of water poured into the kettle were converted into steam in thirty-five minutes, or at the rate of a little over three pints and eight ounces per hour. In a drawing-room holding 4,184 cubic feet of

air, and having an adjoining back room about half as large, with which it communicated, on one occasion I could not obtain any marked increase of moisture; on another, the conversion of water into steam at the rate of four pints and four ounces per hour succeeded in adding only 5 per cent. of relative humidity; the outside temperature at the time was about 40° , and the relative humidity about 84 per cent. Another observation was made in a bedroom of a capacity of 3,218 feet; while the air out of doors contained 83 per cent. of relative humidity, with a temperature of 53° . The atmospheric moisture was 71 per cent. in the room before steam was emitted; the steaming with a common bronchitis-kettle was continued from 3.38 P.M. till 5.10 P.M.; and an increase of relative humidity by 1 per cent. only could be obtained. In this last experiment, I observed that, when the thermometers were held full in the stream of vapour, about a yard from the spout of the kettle, both stood at 70° , showing the air to be saturated; while, if the instruments were placed close to the steam, at that distance from the kettle, though not actually in the vapour, no increase of dampness was observed beyond that of the other parts of the room.

The results of these observations are not altogether encouraging as to the use of the ordinary bronchitis-kettle for steaming the room of an invalid. With the object of evaporating a larger weight of water within a given time, I have had a tin kettle made, supplied with tubes on the principle of the tubular boiler for steam-engines. This boiler

may of course be any size, but for private use I have had it made seven inches in length, six inches in breadth, and four inches in depth; four tubes, having each of them one inch in diameter, are passed through the boiler, and soldered to it top and bottom. Two necks are also soldered in the boiler; the steam delivery-pipe is connected with one of them, while a straight tin tube run through a perforated cork is fitted into the other. This tube, which is funnel-shaped at its upper end, is lowered into the water to about half an inch from the bottom, and answers three purposes: first of all, when steam is emitted through it, the water in the boiler is shown to be too low; then it allows water to be added at any time without the risk of burning one's fingers by removing a cork or a screw-tap; and thirdly, should the steam delivery pipe become accidentally stopped by some unforeseen cause, this tube will act as a safety-valve, letting out water and steam, and preventing any possibility of an explosion. Four short iron legs assist in holding up the kettle on the fire, and support it when not in use. The advantage of the tubes in increasing the surface exposed to the heat is very obvious; four tubes, with three inches in circumference and four inches in length, would give an additional surface of forty-eight square inches, or about double that of the bottom of the kettle. I propose to call this vessel the Bronchitis Tubular Kettle; a tap can be fitted into the side of the kettle, away from the fire, and it may be observed that in every case where a large volume of steam is wanted, and boiling water required with as little delay as possible, there can be no simpler or cheaper means of attaining these objects.

The cost of this kettle will be, I understand, under ten shillings, without the tap. Mr. Probyn, chemist, 55, Grosvenor Street, and 7, Pall Mall East, is prepared to supply them. It will be important to keep the tubes clear of soot, and brushes will be sold for the purpose. I shall have no pecuniary interest in the sale of the bronchitis-tubular kettle.

In a first experiment with that boiler, I poured into it three pints of cold water, and placed the kettle on the fire of the small room holding 1454 cubic feet of air at six minutes past noon; at 12.13, or only

seven minutes later, the water was boiling and steam given out in large volumes. The temperature out of doors was 40° , and relative humidity 84 per cent.; while the atmospheric moisture in the room registered 58 per cent. Observations as to the relative humidity in the room while steaming was in progress were made every five minutes. A maximum increase of relative humidity amounting to 15 per cent. was obtained in thirty-two minutes; very soon afterwards, I observed steam coming out at the funnel, and the operation was discontinued. There were thirteen ounces of water left in the boiler, the evaporation having, therefore, taken place at the rate of very nearly four pints and eight ounces per hour.

Another experiment was made on a dull and cold day in February. The readings out of doors were 37° for temperature, and wet bulb 35.5° , corresponding to 87 per cent. of relative humidity. The object was to try the steaming of my bedroom, holding 3218 cubic feet of air, with the tubular kettle. The relative humidity in the room before steam had commenced being emitted was 58 per cent. Observations were made every five minutes. I also used in this experiment a hair hygrometer, which, although very sensitive to moisture, could not be reckoned as giving such accurate indications as the dry and wet bulb thermometers. I shall, therefore, restrict myself to those readings. At 12.33, steam began arising from the tubular kettle, then holding three pints of water. At 1.25, the relative humidity had risen to 67.5 per cent., or by 9.5. From 1.35 to 2.15, I was away; but on returning into the room at 2.15 P.M., I found 70 per cent. of relative humidity, an increase by 12, which proved to be the maximum degree of humidity obtained. The hair-hygrometer had only shown an addition of 9 per cent. of humidity. From 2.15 to 2.50 P.M., when the experiment was concluded, the moisture varied between 70 and 67.5 per cent., though falling once to 63.5 per cent. The maximum increase of 12 in this case was obtained with an evaporation taking place at the rate of only one pint and four drachms per hour. The air on that occasion was very dry indoors, and cold and rather damp outside. As the external air had not much capacity for moisture, while that in the room was accessible to a considerable addition of humidity, the steam emitted remained in the room and increased the dampness of its atmosphere; had the open air been warmer and drier, its capacity for moisture would have increased, and a smaller accession of humidity would have been obtained from the amount of steam emitted. It is, indeed, remarkable that the air out of doors should have such an influence on that of a room with closed doors and windows.

In conclusion, it must be borne in mind that the steaming of the atmosphere indoors yields less humidity than might be anticipated, especially in a large room; the increase of moisture will depend on the temperature and humidity out of doors, on the degree of atmospheric humidity in the room, and on the amount of water vapourised within a given time. The tubular kettle, with the flame playing through its tubes, must give out on the same fire a larger amount of steam within a given time than the ordinary bronchitis-kettle; but, of course, the rate of evaporation of the water will depend in a great measure on the brightness of the fire.

As to the actual increase of moisture obtained by emitting steam in a closed room, I should think an accession by 10 or 15 per cent. of relative humidity may be expected under favourable circumstances, especially with the use of the tubular kettle; while under unfavourable conditions a slighter increase will be obtained, and even in a large room, the humidity added may be scarcely appreciable by the hygrometer.

PRESERVING FLUID FOR MEAT.—J. Wickersheimer, whose patent of a preserving fluid for anatomical specimens was purchased by the German government (see *New Remedies*, 1880), has patented a new liquid for the preservation of meat intended for food. Its composition is as follows: 36 grammes of potassa, 15 grammes of chloride of sodium, and 60 grammes of alum are dissolved in 3 litres of water; the solution heated to 50° C. (122° F.), and afterwards 9 grammes of salicylic acid added, together with 45 grammes of methylic alcohol and 250 grammes of glycerin. In smaller animals, 100 grammes of the liquid are used for every kilogramme of weight of body; in larger animals, the amount may be reduced to 40 grammes per kilogramme. The liquid is either injected, before slaughtering, directly into the heart, or, after slaughtering, in the carotid. In the case of neat cattle and hogs, 3 grammes of saltpetre are added to the above liquid. The preserving power of the latter may be augmented by increasing the methylic alcohol to 20 grammes, salicylic acid to 12 grammes, and glycerin to 450 grammes per litre of liquid. The meat may then be preserved two or three weeks entirely without odour.—*Chem. Zeit.*, 1880. No. 52.