

he got someone to write a letter from his dictation to Mr. Penniquick, our family solicitor, saying that he had just come from Australia, and wished to send General Osborn some tidings of his son who was out there. Penniquick fell into the trap, and wrote to the address given him.

"Rutherford died in a lodging somewhere in the East-end of London, and it was that letter of Penniquick's, found on his person, which led to his identification."

"Of course he came to the general to get money from him?" I said.

"Yes, and father flatly refused: told him he had broken his word, and threatened to kick him out of the house; and then the wretched man said he would go to the Union in the town here to get relief, and would tell them who he was. Poor father could not stand that, and gave him the key of his drawer, telling him to take what he wanted, but to remember that what was

there had to last him two months. Rutherford took it all, but father does not remember anything that happened after he gave the keys."

I had not been able to take my eyes off our Juno's face during this narration, and after she had gone I said to my wife—"Do you know, my dear, that our ideas of female beauty are quite conventional and absurd. We have got to admire arched eyebrows, thin noses, and tiny mouths, and I verily believe it is those monstrous fashion-plates which have corrupted and vitiated our taste. The Greeks perceived, with their unerring taste, what is undoubtedly the highest type of female beauty."

"They had fixed ideas on the subject, no doubt," she said, "and did not allow their heads to be turned by the last example."

I verily believe that my dear, affectionate partner intended this remark to be very cutting.

FRESH AIR AS A MEDICINE.

BY A FAMILY DOCTOR.



FOR years past the many virtues of fresh air have been loudly proclaimed, both in season and out of season. Yet much ignorance still prevails in regard to its value and the necessity for it—many even of those who profess to believe in its excellence take every

means to keep it out of their own houses as completely as possible. A widespread notion exists, for example, that draughts necessarily accompany an abundant supply of fresh air; and as it is quite obvious that draughts are to be avoided for health's sake, it seems to follow that risk is incurred in thoroughly ventilating our houses. But draughts really mean an unequal distribution of the incoming air, which results in the production of currents; and this unequal distribution is due to a defective system of ventilation.

A few simple and well-known experiments teach us the necessity for fresh air and the ill-effects of cutting off the supply: *e.g.*, if a piece of lighted candle be placed in a closed glass jar, the light gradually becomes faint and eventually goes out, showing that combustion is impossible except in fresh air. Every child can tell us the reason. The oxygen in the jar has been used up and carbonic acid gas is formed. It is this same action that takes place in a colliery explosion; the "after-damp," which proves so fatal to the colliers, suffocating those who escape injury from the explosion itself, is chiefly carbonic acid gas, which is formed by the ignition of the "fire-damp." It neither supports combustion nor respiration.

Numerous instances of its ill-effects upon health may be cited—perhaps the best known is the history of the Black Hole of Calcutta. We know also that the health of our army and of our navy has materially improved since better systems of ventilation have been introduced. It is therefore certain that a sufficient supply of fresh air is necessary for health. Learning facts and applying them to every-day life are, however, two very different things; and I venture to think that the practical application of our knowledge of ventilation and of the value of fresh air is not so well carried out as it should be. If we consider for a moment all the agents which are at work in our houses consuming the oxygen which is necessary for life and activity, we shall see the necessity of providing a constant renewal of it.

In the first place we have fires. They are, however, distinctly beneficial, because they aid largely in promoting ventilation, and because also the injurious products of combustion are at once removed. In fact, if a fire draws well, it is positive proof that there is a certain quantity of fresh air entering the room, and a smoky chimney often merely depends upon an insufficient air-inlet. Burning gas is another matter. Here we have a very large quantity of air rendered useless, and all the products of combustion are distributed through the room—products which include an irritating acid, which may be present in a sufficiently large quantity to injure delicate fabrics. I may mention that the objection to warming a bedroom by lighting the gas depends upon these facts. Lamps and candles are less injurious; still, they use up a considerable quantity of oxygen and generate much carbonic acid gas. The ideal artificial light is the electric incandescent lamp,

which has absolutely no effect upon the air of a room.

Stoves do much to vitiate the atmosphere of a room. Badly-made stoves, especially if the pipe be made of cast-iron, may give rise to an exceedingly poisonous gas, called carbonic oxide, which even in excessively minute quantities is injurious to health. The people who live in the room are, however, the means by which the air is most surely vitiated. It was thought at one time that it was simply by expiring carbonic acid gas and using up the oxygen in the process of respiration that the air is rendered unfit for use; but this did not explain the unpleasant and stuffy smell noticed in badly-ventilated rooms, and it was further found that pure carbonic acid could be introduced into a room in far greater quantity than is found even in overcrowded apartments without producing any ill effect upon those living in it. It is now believed that the injurious nature of air which has been breathed is due to the presence in it of minute quantities of very poisonous organic matter, supposed to be exhaled from the lungs.

Before considering how the air of a room may be purified by ventilation, it may be as well to point out how serious a risk is experienced by those who refuse to admit plenty of fresh air into their houses. The widespread presence of tuberculosis, or consumption, in England is closely associated with the want of proper ventilation in living-rooms and in workshops. Fishermen, agricultural labourers, and all those following outdoor occupations are comparatively rarely consumptive, while the disease is only too terribly prevalent among those who work in small and crowded rooms. Other diseases, among which may be mentioned measles, whooping-cough, bronchitis, and especially diarrhoea, are not only more frequent in badly-ventilated houses, but are also more fatal than where the ventilation is efficient. These diseases are responsible for the greater proportion of deaths which occur in infancy and early childhood. It is therefore certain that the plea for fresh air is not merely a fad of the sanitary enthusiast, but is justified by the evil effects resulting from its absence.

The bedroom, in which we stay the longest time uninterruptedly, is unfortunately the worst ventilated room in the majority of cases. The door is shut, the windows closed, the fireplace covered up; even sand-bags are used to keep out the ever-dreaded draughts; the bed is surrounded with curtains, by which the foul air is prevented from being distributed through the room, and thereby diluted. The wonder is, as the Irishman remarked, that we don't wake up some fine morning and find ourselves dead in our beds. Too often our sleep is broken or disturbed by dreams, and we begin the day heavy and dull; we assign all manner of reasons for this state of

things except the right one: the room should be large enough to contain constantly a sufficient supply of fresh air. Theoretically, the minimum amount of air-space to be allowed for each person is one thousand cubic feet: that is to say, the space supplied by a room ten feet high, ten feet long, and ten feet broad, making no allowance for space occupied by furniture. Even the air contained in such a room will only suffice for quite a short time. In this climate the air of a room, unless artificial means of ventilation are applied, cannot be changed more than three times an hour without causing draughts; and the reason why one thousand cubic feet of space is given as the minimum is that three thousand cubic feet of air per hour are required by an average adult. It will be readily understood, therefore, that in a room closed up as I have described the atmosphere becomes vitiated to an injurious degree.

Effectual ventilation of rooms can easily be arranged. Fresh air can enter by the window and the impure air escape through the chimney. If it be objected that an open window is draughty, the current of air can be directed upwards by a very simple device. The lower window-sash is raised and the open space below filled in with a board three inches wide, fitting the window-frame accurately. The current of air enters between the two sashes, and a draught is avoided. Tobin's ventilating tubes are based upon this principle. Of course an outlet for foul air must be provided, and it is easy to make an opening into the upper part of the chimney-breast. If in the morning the windows be opened widely—top and bottom—so as to admit air and sunshine freely, a great improvement in sleep and in general health will be experienced by those who slept in the previously sealed-up bedroom. Children are particularly susceptible to the influence of impure air, and therefore especial care should be taken to protect them from it. Schoolrooms are often badly ventilated, and consequently the children suffer in health and in temper. Much of the headache and listlessness popularly ascribed to over-pressure is really due to insufficient oxygen.

One thing must not be forgotten: we must get pure air to start with from outside. Very often the air as it enters is impure, owing to faulty drains or ash-pits full of decomposing matters. Or the house may be built on that abomination known as made soil: that is to say, over a hollow filled up with a soil made up of all sorts of town refuse. Foul gases are generated, which enter the house and take disease with them. Much care ought, therefore, to be taken to select a house which shall be free from the dangers of insanitary surroundings. If, in addition, plenty of air and light are constantly admitted, much will have been done to secure long life, robust health, and happiness.

