exposed to the unhealthy influence on his heart of confinement to a close office or shop, worry, irregular hasty feeding, alcoholic indulgence in connection with his trade or profession, and unwise attempts at violent muscular exercise at the week-end or in the holiday season; or he may be guilty of entire disregard of the rules of bodily and mental hygiene, and bring on in this way premature degeneration of his cardio-vascular system. Still more numerous are the causes at work in the production of "soldier's heart." We have but to picture to ourselves, if we can, the physical strain, the mental excitement, the bodily hardships—including exposure to both extremes of temperature—and the coarse fare which have been the lot of many thousands of our brave troops in the Boer war, to understand how the fighting soldier "ages" quickly, and in particular ages in his heart and arteries. Add to these unfavourable influences syphilis, alcohol, and tobacco, which unfortunately must be added in many instances, and the chance of escape from grave disease of the circulation in the soldier is practically *nil*. But the soldier's heart is also met with elsewhere than in the army. The clergyman from the slums, who has lived and toiled and fought with various success through alternate periods of excitement and depression, and has thus suffered much both in mind and body, comes to us with high-tension pulse, a tortuous radial artery, a large heart, and a systolic murmur over the aorta, and complains of an attack of angina. His wife, who has laboured in the parish for years (she is 76 and still active in her work of charity), has also a thickened radial artery, a large heart, and a systolic basic murmur, with no discoverable cause of these evidences of a diseased circulation but the life that she has led amongst the poor around her. Perhaps such cases of cardio-vascular disease might be most correctly said to be due to the wear and tear of life. They are met with also in the traveller or explorer who has spent years of his life in search of adventure; and they are found in a man who has never left home, but whose years have been filled with the toil and anxiety of his position.

Old-Standing Organic Heart Disease.

It is necessary, however, to qualify the above statements in two respects. In the first place the heart and blood vessels may have been so damaged in early life that they fall victims to influences which, whether in kind or in degree, would have been insufficient to produce idiopathic disease of these organs. This brings me to the subject of old-standing valvular disease, mostly rheumatic in origin, adherent pericardium and chronic parietal strain in middle-aged and old subjects. A considerable number of our cases are of this type, and they have to be mentioned here to give completeness to the plan of description, but they are outside the range of our immediate subject. In the second place, the heart and vessels at 40, although to the naked eye free from damage, may be molecularly weak and unable to offer effective resistance even to influences of an ordinary character.

"Family Heart."

I have now arrived at the last, and certainly one of the most interesting, of the causes of disease of the heart and arteries in middle and advanced life, there are some persons whose hearts and arteries cannot carry them through the wear and tear of what may be called everyday life for more than forty or fifty years. The vital energy of their tissues is exhausted prematurely; they are already old at 45; degeneration of their muscle and other cells sets in early, reminding us of primary myopathic paralysis in children. This type of case is described as "family heart," for it also runs in families, three, four, five, or more members of which—as in instances that I have myself observed—may have all died suddenly of cardiac disease, some of them at an early age. Similarly, it is not by any means unusual to find quite young men—say of 30—with vessels already much enlarged; and, I may add, equally young subjects with their lungs already emphysematous, although there is no history of respiratory strain, reminding us of the very common association of emphysema with arterial sclerosis in old age. These cases of family heart and premature arterial sclerosis are the links that connect diseases of the heart and arteries in middle and advanced life of definite pathological origin with the genuinely senile changes in their tissue elements

which render existence untenable at last, and which may be said to be the result of the exhaustion of their nutritional energy by the thousand natural shocks that flesh is heir to.

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³ *Op. cit.*, p. 48. ⁴ *Op. cit.*, p. 15.

THE MILROY LECTURES

ON

THE INFLUENCE OF THE DWELLING UPON HEALTH.

Delivered before the Royal College of Physicians of London.

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LECTURE II.

EFFECTS UPON HEALTH OF CERTAIN KINDS OF DWELLINGS. THERE are no conclusive statistics available in reference to the old type of vertical houses sublet in separate dwellings or tenements, but the inference to be drawn is that they produce an unfavourable influence upon health, and that in houses of six storeys and over the order of mortality from lowest to highest occurs on the first, second, ground, third, basement, and fourth floors.

An investigation into the statistics of Peabody Buildings in London as examples of "flat houses" was made by Dr. Newsholme¹ in 1888-90. He found that their death-rate averaged about 2 per 1,000 lower than that of London during the twelve years ending with 1885. During the four subsequent years the death-rate of the buildings has remained about stationary, while that of London has shown a further decline, thus making the metropolitan death-rate approximate more closely that of the Peabody Buildings.

The infantile mortality is much lower in the Peabody Buildings than for all London. The death-rate from diarrhoea is slightly lower and from enteric fever only half that of the whole metropolis. But diseases more directly due to infection (scarlet fever, diphtheria, and, still more, whooping-cough and measles) are more fatal, and therefore probably more prevalent.

The death-rate from phthisis and other tuberculous diseases is slightly higher in the Peabody Buildings than for all London. The Medical Officer of Health of St. Giles, Dr. Lovett, has kindly supplied me with the records he has kept through a series of 10 years of the population, births and deaths in four large blocks of buildings in St. Giles². Comparing the buildings, St. Giles, and London, from ten years, 1890-1899, the percentage of population under 5 years was respectively 17.0, 10.1 and 11.9 per cent.; the birthrate 37.3, 27.6, and 30.4 per 1,000 of population; the mortality under 1 year per 1,000 births 130, 153 and 160; the death-rate under 5 years per 1,000 population under 5 years 50.7, 76.9, and 65.6; the death-rate over 5 years per 1,000 population over 5 years, 10.4, 16.3, 13.6; the death-rate at all ages per 1,000 population at all ages, 17.3, 21.3, and 19.8; and the death-rate from the seven principal zymotic disease, 3.0, 2.1 and 2.7.

The later investigation in the main corresponds with the earlier, for although whooping-cough comes out much better, measles come out much worse, and the conclusion is confirmed that the diseases due to direct infection are more prevalent in buildings composed of multiple dwellings.

[Reasons were given why a comparison between statistics relating to houses demolished and on an insanitary area, and of new buildings erected on the site would be of little value.]

The association of certain houses with certain diseases is a mode of classification adopted by many investigators. Consumptive houses are amongst this class. Pathogenic investigation has also been extended to pneumonia houses and suspected cancer houses, but they must rather be regarded as suffering from infection remediable more by isolation, disinfection, and cleanliness than by improved construction and usage.

[The effects of certain defects of dwelling-houses on health

were then described. The defects enumerated were those causing bad ventilation, coldness, dampness, deficient light, deficient water supply, and general atmospheric impurity.]

An unavoidable consequence of the aggregation of communities is that the atmosphere of a town should suffer deterioration. The reduction of impurities, especially smoke and fumes, is the work of municipalities, as is also the provision of open spaces and vegetation.

The facility of water supply determines the locality of settlement of a community; its growth is largely determined by the amount, and its health by the purity. The constant high-pressure system supplies the sufficiency, but the accessibility is sadly to seek, especially in ordinary vertical houses, sublet in many dwellings or tenements; and a similar observation applies to drainage.

[Experiments and observations were described showing that the healthiness of the dwelling in this country increased in proportion to the amount of daylight and sunlight admitted, and that dryness of the site and of the house were essential to a healthy dwelling.]

The main characteristics of jerry-built dwelling-houses are deficient dryness and deficient equability of temperature; popularly they are said to be cold and damp, the dampness coming through the walls, and the coldness being due to their flimsiness.

[The ill-effects of air deficiency and effluvia were then alluded to.]

It has been shown by experiments³ upon rabbits, guinea-pigs, and upon rats, which have been confirmed, that the inspiration of putrid gases predisposes the animals to the pathogenic action of even attenuated typhoid bacilli and of bacterium coli. It is probable, therefore, that the gases from drains, sewers, and other polluted sources predispose those who inhale them sufficiently, and especially newcomers, to enteric fever and to other diseases.

Ground vapours also produce ill-effects. The power of promoting growth of tubercle bacilli is particularly manifest when common wall paper is covered with condensed organic vapour from ground air.

THE EFFECTS OF CONSTRUCTION AND MISCONSTRUCTION OF DWELLINGS ON HEALTH.

The direction and width of streets and the height of houses are important points in their influence upon dwellings and health. The main object of orientation of streets is to provide the maximum of sunshine to houses, the rear as well as the front. Arnold has concluded that the orientation of streets is beyond exact control, and attention should rather be directed to limiting the height of houses in relation to the width of streets. The practical limit has been adopted that houses should not exceed in height the width of the open spaces at the front and at the rear, but as only half the space at the rear is assumed to belong to one house, the house is permitted to be raised twice the height of the width of its own rear space.

[The provisions of the London Building Acts of 1894 and 1898 were then described.]

The lines adopted for the admission of light and air to houses have passed three graduated stages. The first stage is illustrated by mediæval houses with projecting upper storeys; the second by straight-fronted existing streets; the third by the backs of more recently-erected houses with receding upper storeys.

The careful provision of external light and air demands the equally careful provision of large windows extending up to the ceiling of dwelling-rooms, and wherever it can be afforded the fixing of ventilating grates in habitable rooms. With regard to the surface of the open spaces immediately contiguous to dwelling houses, the soil in towns always becomes polluted and prejudicial to health. There are two ways in which it can be effectually dealt with, the one is by cultivation as a garden, the other is by impervious paving so levelled and drained as to be readily cleansed. It should be definitely provided that such spaces should be either regularly cultivated or permanently paved.

[Three main structural divisions of domestic buildings were described, the horizontal, as the one-storey cottage, the vertical, and the vertico-horizontal as seen in Parisian blocks, and the defects, particularly of the latter, were pointed out.]

Internal common staircases in compound dwelling-houses by want of ventilation are prejudicial to health, as they render the contained air common to all the dwellings opening upon them. It is essential that a common stairway should be external or against an outer wall and be amply ventilated at each floor level by permanent openings. The insertion of windows may secure light, but does not necessarily secure air.

It must be borne in mind that the "flat" dwellings in all cases in which the rooms are entered directly from the common stair, or in which the vestibule, lobby, or corridor is not ventilated directly from the outer air, is essentially one large space divided into smaller spaces, compartments, or rooms, and the air supply is common to all, as there is no ventilated staircase open to each room as in an ordinary house.

In new buildings the Local Government Board wisely insists upon lobbies between w.c.'s and dwellings being ventilated by permanent openings into the outer air, and upon common staircases being similarly ventilated, but the London County Council states⁴ that it has provided windows (and, it may be added, doors) to the lobbies and staircases in such buildings because of the unsightly way in which tenants attempt to block the openings. Continuous ventilation by means of permanent openings is the only method of construction of permanent value.

In order to provide for through ventilation and against back-to-back dwellings, I have on various occasions insisted that one of the conditions of construction must be that in every dwelling of more than one room the alternative rooms must be situated upon opposite sides of the building in such a manner as to secure perfilation from opposite fronts.⁵

With reference to the size of rooms in new buildings, the London County Council has adopted a minimum of 96 square feet for bedrooms and 144 square feet for living-rooms, and the latter may be taken as a maximum, with a height now of 8½ feet, formerly 9 feet. It is a mistake to make large rooms for the poorer classes, as it leads to overcrowding, the placing of more beds in the room, and the mixing of the sexes. If the same sized family that can live in one very large room live in two smaller rooms they are housed under better conditions of aëration, decency, and physical well-being. It is important also to remember that raising the age at which children remain at school, and at which they can commence to work in factories, tends to keep them at home with their parents without earning anything towards enlarging the dwelling by another room.

The minimum number of rooms in dwellings for the poorer classes is a subject⁶ upon which I entered fully at the Birmingham Health Congress, and pointed out that the differences of sex and age are the factors that render family life impossible in a single room, and that in Glasgow Dr. J. B. Russell had shown that between 1871 and 1891 the persons living in one room fell from 30.4 to 18.0 per cent. of the total population, whereas those living in two and three room dwellings rose exactly in the same proportion as those in the one room had fallen, namely, from 54.7 to 67.2 per cent. of the total population.

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THE HISTOLOGY OF THE URINARY TRACT IN ITS RELATIONSHIP TO MORBID URINARY DEPOSITS.

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THE value of the microscope as an aid to the recognition of the pathology of various diseases is naturally greatest in those cases in which it will enable us to form a correct opinion as to the nature of the disease during life. To this end the services and the opinion of the morbid histologist are in constant demand, primarily in those diseases which