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BUILDINGS IN GARDEN CITIES.

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ADDRESS TO ANNUAL MEETING OF ASSOCIATES.

ON

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THE often quoted address of Dr. Benjamin Ward Richardson on "Hygeia, a City of Health," was delivered at Brighton, in the year 1875, and I thought it might be interesting to extract from that address those points which relate to our subject to-night, in order to see how far the suggestions made 30 years ago have been realised.

"Our city, which may be named Hygeia, has the advantage of being a new foundation, but it is so built that existing cities might be largely modelled upon it."

"The population of the city may be placed at 100,000, living in 20,000 houses built on 4,000 acres of land, an average of 25 persons to an acre. This may be considered a large population for the space occupied, but since the effect of density on vitality tells only determinably when it reaches a certain extreme degree, as in Liverpool and Glasgow, the estimate may be ventured."

"The safety of the population of the city is provided for against density by the character of the houses which ensures an equal distribution of the population. Tall houses overshadowing the streets and creating necessity for one entrance to several tenements are nowhere permitted. In streets devoted to business, where the tradespeople require a place of mart or shop, the houses are four storeys high, and in some of the western streets where the houses are separate, three and four-storeyed buildings are erected; but on the whole it is found bad to exceed this range, and as each storey is limited to 15 feet, no house is higher than 60 feet."

"The substratum of the city is of two kinds, at its northern and highest part there is clay, at its southern and south eastern, gravel. Whatever disadvantages might spring in other places from a retention of water in a clay soil is here met by the plan universally followed of building every house on arches of solid brickwork. So where in other towns there are areas and kitchens and servants' offices, there are here subways through which the air flows freely, and down the inclines of which all currents of water are carried away."

"The acreage of our model city allows room for three wide streets or boulevards which run from east to west, and which are the main thoroughfares. Beneath each of these is a railway, along which the heavy traffic of the city is carried on. The streets from north to south, which cross the main thoroughfares at right angles, and the main streets which run parallel, are all wide, and owing to the lowness of the houses are thoroughly ventilated, and in the day are filled with sunlight. They are planted on each side of the pathways with trees and in many places with shrubs and evergreens. All the interspaces between the backs of houses are gardens. The churches, hospitals, theatres, banks, lecture-rooms, and other public buildings, as well as some private buildings, such as warehouses and stables, stand alone, forming parts of streets and occupying the position of several houses. They are surrounded with garden space, and add not only to the beauty but to the healthiness of the city. The large houses of the wealthy are situated in a similar manner. The streets of the city are paved throughout with the same material. As yet wood pavement set in asphalte has been found the best. It is noiseless, cleanly, and durable. Tramways are nowhere permitted, the system of underground railways being found amply sufficient for all purposes. The side pavements, which are everywhere ten feet wide, are of white or light-grey stone; they have a slight incline towards the streets, and the streets have an incline from their centres towards the margins of the pavements."

"From the circumstance that the houses of our model city are based on subways there is no difficulty whatever in cleansing the streets—no more difficulty than is experienced in Paris; the accumulation of mud and dirt in the streets is washed away every day through side openings into the subways, and is conveyed with the sewage to a destination apart from the city. Thus the streets everywhere are dry and clean, free alike of holes and open drains. It will be seen from what has been already told, that in this our model city there are no underground cellars, kitchens, or other caves; there is not permitted to be one room underground. The living part of every house begins on the level of the street. The houses

are built of a brick which has the following sanitary advantages. It is glazed and quite impermeable to water, so that during wet seasons the walls of the houses are not saturated with tons of water, as is the case with so many of our present residences. The bricks are perforated transversely, and at the end of each there is a wedge opening, into which no mortar is inserted, and by which all the openings are allowed to communicate with each other. The walls are in this manner honeycombed so that there is in them a constant supply of common air let in by side openings in the outer wall, which air can be changed at pleasure and, if required, can be heated from the firegrates of the house."

"The bricks intended for the inside walls of the house, those which form the walls of the rooms, are glazed in different colours according to the taste of the owner, and are laid so neatly that the after adornment of the walls is considered unnecessary, and indeed objectionable. By this means those most unhealthy parts of household accommodation, layers of mouldy parts and size, colour-stuff or distemper, are entirely done away with. The walls of the rooms can be made clean at any time by the simple use of water, and the ceilings, which are turned in light arches of thinner brick or tile, coloured to match the walls, are open to the same cleansing process. The colour selected for the inner brickwork is grey, as a rule, that being most agreeable to the sense of sight, but various tastes prevail, and art so soon ministers to taste that in the houses of the wealthy delightful patterns of work of Pompeian elegance are soon introduced. As with the bricks, so with the mortar and the wood employed in building: they are rendered as far as possible free of moisture. Sea-sand containing salt, and wood that has been saturated with sea-water, two common commodities in badly-built houses, find no place in our modern city."

"The most radical changes in the houses of our city are in the chimneys, the roofs, the kitchens and their offices. The chimneys, arranged after the manner proposed by Mr. Spencer Wells, are all connected with central shafts into which the smoke is drawn, and after being passed through a gas furnace to destroy the free carbon, is discharged colourless into the open air. The city therefore, at the expense of a small smoke rate, is free of raised chimneys and of the intolerable nuisance of smoke."

"The roofs of the houses are but slightly arched, and, indeed, are all but flat. They are covered either with asphalte, which experience out of our supposed city has proved to last long and to be easily repaired, or with flat tile. The roofs, barricaded round with iron palisades tastefully painted, make excellent out-door grounds for every home. In some

instances flowers are cultivated on them. The housewife must not be shocked when she hears that the kitchens of our model city and all the kitchen offices are immediately beneath their garden roofs—are, in fact, on the upper floor of the house instead of the lower. In every point of view, sanitary and economical, this arrangement succeeds admirably. The kitchen is lighted to perfection, so that all uncleanness is at once detected. The smell which arises from cooking is never disseminated through the rooms of the house. In conveying the cooked food from the kitchen in houses where there is no lift, the heavy weighted dishes have to be conveyed down, the emptied and lighter dishes up stairs. The hot water from the kitchen boiler is distributed easily by conducting pipes into the lower rooms, so that in every room and bedroom hot and cold water can at all times be obtained for washing or cleansing purposes; and as on every floor there is a sink for receiving waste water, the carrying of heavy pails from floor to floor is not required. The scullery, which is by the side of the kitchen, is provided with a copper and all the appliances for laundry work, and when the laundry work is done at home the open place on the roof above makes an excellent drying ground.”

“In the walls of the scullery is the upper opening to the dustbin shaft. This shaft, open to the air from the roof, extends to the bin under the basement of the house. A sliding door in the wall opens into the shaft to receive the dust, and this plan is carried out on every floor. The coal-bin is off the scullery, and is ventilated with the air through a separate shaft which also passes through the roof.”

“On the landing in the second or middle storey of the three-storeyed houses there is a bath room supplied with hot and cold water from the kitchen above. The floor of the kitchen and of all the upper storeys is slightly raised in the centre and is of smooth grey tile, the floor of the bath room is the same. In the living-rooms, where the floors are of wood, a line oak margin of floor extends two feet around each room, over this no carpet is ever laid. It is kept bright and clean by the old-fashioned bees-wax, and impurities in the air are ozonised by the process. Considering that a third part of the life of man is or should be spent in sleep, great care is taken with the bed-rooms, so that they shall be thoroughly lighted, roomy, and ventilated. Twelve hundred cubic feet of space is allowed for each sleeper, and from the sleeping apartments all unnecessary articles of furniture and of dress are rigorously excluded.”

“Old clothes, old shoes, and other offensive articles of the same order, are never permitted to have residence there. In most instances the rooms on the first floor are made the bed-rooms, and the lower the living-rooms.

In the larger houses bed-rooms are carried out in the upper floor for the domestics. To facilitate communication with the kitchen and the entrance hall so that articles of food, fuel and the like may be carried up, a shaft runs in the partition between the houses, and carries a bucket-lift in all houses that are above two storeys high. Every heavy thing to and from the kitchen is thus carried up and down from floor to floor and from the top to the basement, and much unnecessary labour is thereby saved. In the two-storeyed houses the lift is unnecessary, a flight of outer stairs leads to the upper or kitchen floor."

"The warming and ventilation of the houses is carried out by a common and simple plan. The cheerfulness of the fireside is not sacrificed, there is still the open grate in every room, but at the back of the firestove there is an air-box or case, which, distinct from the chimney, communicates by an opening with the outer air, and by another opening with the room. When the fire in the room heats the iron receptacle, fresh air is brought in from without and diffused into the room at the upper part, on a plan similar to that devised by Captain Galton, F.R.S."

"As each house is complete within itself in all its arrangements those disfigurements called back premises are not required. There is a wide space, consequently, between the back parts of all houses, which space is in every instance turned into a garden square, kept in neat order, ornamented with flowers and trees, and furnished with playgrounds for children young and old."

"The houses being built on arched subways, great convenience exists for conveying sewage from and for conducting water and gas into the different domiciles. All pipes are conveyed along the subways and into each house from beneath. Thus the main of the water-pipe and the mains of the gas are within instant contact on the first floor of the building, and a leakage from either can be immediately prevented. The officers who supply the commodities of gas and water have admission to the subways, and find it most easy and economical to keep all that is under their charge in perfect repair."

"It has been found in our towns generally that men and women who are engaged in industrial callings, such as tailoring, shoe-making, dress-making, lace-work, and the like, work at their own home amongst their children. That this is a common cause of disease is well understood. In the model city these dangers are met by the simple provision of workmen's offices or workrooms. In convenient parts of the town there are blocks of buildings designed mainly after the manner of the home, in which each workman can have a workroom on payment of a modest sum per week.

Here he may work as many hours as he pleases, but he may not transform the room into a home."

"Each block is under the charge of a superintendent, and also under the observation of the sanitary authorities. The family is thus separated from the work, and the working man is secured the same advantages as the lawyer and the merchant now possess; or, to make the parallel more correct, he has the same advantages as the man or woman who works in a factory and goes home to eat and to sleep. In most towns throughout the kingdom the laundry system is dangerous in the extreme. For anything the healthy householder knows, the clothes he and his children wear have been mixed before, during, and after the process of washing with the clothes that have come from the bed or the body of some sufferer from a contagious malady. In our model community this danger is entirely avoided by the establishment of public laundries under municipal direction. No person is obliged to send any article of clothing to be washed at the public laundry, but if he does not send there he must have the washing done at home. Private laundries that do not come under the inspection of the sanitary officer are absolutely forbidden. It is incumbent on all who send clothes to the public laundry from an infected home to state the fact. The clothes thus received are passed for special cleansing into the disinfecting rooms. They are specially washed, dried, and prepared for future wear."

"Passing along the main streets of the city we see in twenty places equally distant a separate building surrounded by its own grounds: a model hospital for the sick. To make these institutions the best of their kind no expense is spared. Several elements contribute to their success. They are small and are readily removable. The old idea of warehousing diseases on the largest possible scale, and of making it the boast of an institution that it contained so many hundreds, is abandoned here. The old idea of building an institution so that it shall stand for centuries like a Norman castle, but, unlike the castle, still retain its original character as a shelter for the afflicted, is abandoned here. The still more absurd idea of building hospitals for the treatment of special organs of the body, as if the different organs could walk out of the body and present themselves for treatment, is also abandoned. It will repay us a minute of time to look at one of these model hospitals. One is the *fac simile* of the other, and is devoted to the services of every five thousand of the population. Like every building in the place it is erected on a subway. There is a wide central entrance, to which there is no ascent, and into which a carriage, cab, or ambulance can drive direct. On each side the gateway

are the houses of the resident medical officer and of the matron. Passing down the centre, which is lofty and covered in with glass, we arrive at two side wings running right and left from the centre and forming cross-corridors. These are the wards, twelve on one hand for male, twelve on the other for female patients. The cross corridors are 12 feet wide, and 20 feet high, and are roofed with glass."

"The corridor on each side is a framework of walls of glazed brick, arched overhead, and divided into six segments. In each segment is a separate light, elegant, removable ward, constructed of glass and iron, 12 feet high, 14 feet long, and 10 feet wide. The cubic capacity of each ward is 1,680 feet. Every patient who is ill enough to require constant attendance has one of these wards entirely to himself, so that the injurious influences on the sick which are dreaded by mixing up in one large room the living and the dying; those who could sleep were they at rest with those who can not sleep because they are racked with pain; those who are too nervous or sensitive to move or cough or speak lest they should disturb others and those who do whatever please them; these bad influences are absent. The wards are fitted up neatly and elegantly: at one end they open into the corridor, at the other towards a verandah, which leads to a garden. The wards are warmed by a current of air made to circulate through them by the action of a steam engine. If at any time a ward becomes infectious it is removed from its position and is replaced by a new ward. It is then taken to pieces, disinfected, and laid by ready to replace another that may require temporary ejection."

"The few who are insane are placed in houses licensed as asylums, but not different in appearance to other houses in the city. Here the insane live in small communities under proper medical supervision, with their own gardens and pastimes."

It will be seen that there are still many of the points made by Dr. Richardson yet to be taken up in building a model city.

Taking the question of height of buildings, I was struck the other day looking at some photographs of Winnipeg, one of the latest developed cities in Canada, to see that they were building houses of twelve and fifteen storeys, and when I was told later that land in the centre of the city was sold at the highest price per foot ever given for land, it seemed all the more strange. Apparently there is no physical reason like the island site of New York to account for the larger buildings. Winnipeg is situated on a plain that affords boundless means of expansion.

The modern experience of manufacturers, however, is in favour of even

one-storey factories when the price of the land is not prohibitive, and I know of some factories which cover an acre of space all under one roof. The advantage of this, from a manufacturer's point of view, is ease of supervision. The question of adequate means of escape in case of fire and the proper ventilation and heating of such big cubic contents, raise novel points, but should not be difficult of solution. The system of construction is a series of ridge and furrow roofs, carried on iron supports.

The question of limit of area to buildings of this class is being rapidly brought to the front, in the sheds which are required for storing and attending to the motor buses that are being erected in the outskirts of large towns, the Building Act limit of 250,000 cubic feet being much too small.

The method of raising all buildings on arches above the ground has been practised for hospital buildings, but has not been used for private dwellings owing to the cost; it has much to recommend it, *only* the space underneath the house must be sufficiently high to make it get-at-able and so kept clear of rubbish, and until the people are educated up to the appreciation of absolute freedom of air circulation around their houses the space would be sure to be the store-house of all kinds of rubbish.

The perforated bricks described have been used, but they have not taken hold on the public. One of the objections to them is, the way they behave in cases of fire, the face of the brick flying off when the brick is heated and water is turned on. With regard to the case of glazed bricks for the internal surface of walls and ceilings, I think experience has shown that a glazed surface such as those present does not make a comfortable room to occupy, and the usual method at present adopted is to confine the glazed work to a dado about four feet high, and above that to use plaster and some kind of paint or distemper.

The use of concrete blocks made with air spaces inside is being advocated, and it forms a cheap and useful method of building; one of the best of the £150 cottages built at Letchworth was built of this material. **Re-enforced concrete**, that is concrete in which steel bars are introduced in position to take up the strains, is making rapid progress, and some notable buildings have recently been erected in this way, the advantages being that the constructive work is practically homogeneous and the steel is adequately protected in the case of fire. But it must be borne in mind that the element of weight in our solidly built brick structures is not entirely useless, and if the slighter methods of construction which re-enforced concrete allows be employed, the question of wind pressure has to

be taken into account and the building adequately braced to counteract it.

The method of treating the smoke by connecting all the flues with central shafts where the smoke is driven through a gas furnace, the free carbon is destroyed, and the products of combustion discharged colourless into the open air has not yet been tried, but at the recent Smoke Abatement Exhibition a patent was shown which did this in the individual flue: in the 4-in. iron smoke shaft a combustion chamber was inserted, the smoke passed through, and the whole of the free carbon destroyed.

The flat roofs advocated have been tried, and not always with success. The usual method is to cover the space with concrete and lay the asphalt on the top, but care must be taken to prevent the expansion of the concrete pushing the walls out; I knew of this being the case in a building erected by the London School Board in the South of London, the flat roof of the building expanded and pushed the walls out of place. Another objection is that if no false ceiling is made to the rooms under, the moisture in the air is apt to condense on the ceiling.

There is a new method of roofing by means of a material called *rubroid*, which is a preparation of india-rubber laid in two or three thicknesses and covered with gravel; when skilfully laid this makes a cheap and durable roofing material, but I have not heard how it behaves in case of fire.

The suggestion of placing the kitchen at the top of the house has been tried, but has not met with public approval, and I think that there are obvious drawbacks.

The hospital with the wards made to be easily taken down and disinfected has yet to be realised, but there is much to be said in favour of a simpler style of building for the treatment of disease.

I hope I have not tired you by dwelling so long on Dr. Richardson's address, which, although often referred to, is, I fancy, but very little read now-a-days.

At the recent Conference on Garden Cities, Mr. Lever advocated the standardisation of cottage buildings in order to cheapen the cost of building. There is no doubt that a saving can be effected by making the various parts of a house, such as the doors, windows, staircases, etc., in uniform series, and the general dimensions of rooms are more or less fixed; but I think it is to be hoped that such a system may not result in the dreary monotony with which we are unfortunately so familiar in some of our London suburbs.

The exhibition of cheap cottages at Letchworth last year has, I am

afraid, given rather a wrong impression ; the garden city there is one thing and the cheap cottage exhibition was another, and in many ways the exhibition showed what to avoid rather than what was the latest idea on the subject. As this exhibition was the subject of a paper by Mr. Aldwinckle and Dr. Sykes, I do not propose to touch on it to-night, only just to make these remarks in passing. In a circular widely distributed, giving designs and particulars of cheap country cottages, the walls of which are of timber framing either covered with weather boarding or corrugated iron, the following note is interesting:—

“Building By-laws.—With certain exceptions it is our experience that, provided these Timber Framed Dwellings are beyond certain specified distances from other structures, permission is not withheld. In many cases an undertaking to remove the buildings within 10 years if called upon to do so has induced the Council to pass the plans. As can be understood, this in most instances eventually means that the buildings are allowed to stand for an indefinite period.”

I have always understood that the objection to buildings of this class was not so much their liability to fire as that this method of construction was not suitable for human occupation ; on account of the walls and roof being such good conductors the buildings were too hot in summer and too cold in winter, and that they are very liable to become verminous, but it is evident that a good many of these buildings are erected and occupied, and the public authorities, such as the London County Council, in their Lunatic Asylum at Horton, have made use of this method of construction, the building has been occupied for several years, and it has been found to be quite satisfactory. It is curious to note that in such hot places as Suez and Western Australia corrugated iron is used for the roof and walls ; in fact, there is hardly anything else used in Western Australia on account of the scarcity of water ; every drop of rain has to be saved, and therefore the most non-absorbent material used for roofs.

The address was illustrated by 54 lantern slides.