

Outside Medicine

Dr. Ward's Case

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British Medical Journal, 1975, 2, 324-326

Many medical men—and women—have been enthusiastic gardeners.¹ But it is doubtful if any have been devoted to plants with quite such passion, or experienced so spectacular an outcome of their ambitious efforts, as an otherwise little-known surgeon who lived and practised amid the grime of London's dockland in the early years of the last century.

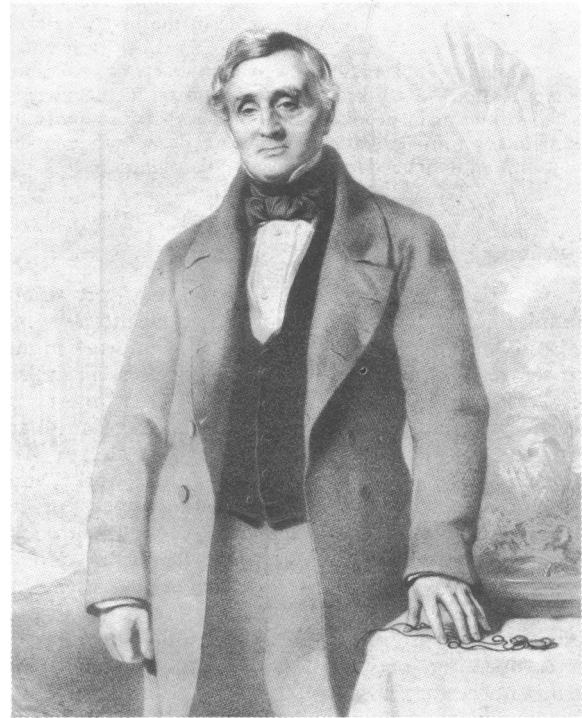
It would be hard to conceive of a more unpromising environment for a future horticulturist to be born into: repeated fogs, of a density and destructiveness thankfully unknown to-day; noxious fumes from the factories all about; soot raining down from the smoke of innumerable chimneys; drab, dirt-encrusted houses; a total lack of trees, gardens, or parks. Yet for the boy who was born here, in Whitechapel in 1791, there were two redeeming features. His father, Stephen Smith Ward, was a man held in exceptionally high repute locally for his medical skill and knowledge, so that rigorous standards and scientific curiosity were no doubt implanted in the son from an early age. Even more important, the docks brought a tang of the exotic that penetrated the whole area. Strange creatures brought in from distant parts, sailors' yarns in smoky taverns, the very look and feel of ships—it would have been an unusual boy who failed sooner or later to succumb. Yet a longing to go to sea is so common a complaint of youth that few parents are inclined to take it seriously. It says much for the unusual quality of this father, therefore, that so far from attempting to stifle the fever that had taken hold of his son he decided instead to allow it to run its natural course—and packed the boy off, when still no more than 13, on a lengthy voyage to Jamaica.

The trick worked. The idea of a sailor's life quickly palled on contact with the harsh reality and the boy returned cured for life. But meanwhile he had acquired another, quite different passion in its place. The luxuriance of the tropical vegetation, in particular the ferns and palms, proved overwhelming in its impact and awoke in him an unquenchable desire ever afterwards for an ambience of foliage and greenery.

Large Bottle

Resolving now to follow his father's profession with a view to succeeding him in his practice, he resigned himself henceforward to the imprisonment of city life. Conscientious, kindly, and blessed with an enviable bedside manner, he made a success of doctoring. But all the time the frustrated plantsman within him clamoured for an outlet.

He compromised as best he could. In summer he frequently rose before dawn to go plant hunting in the country, on



N. B. Ward, F.R.S., F.L.S., &c., &c. Reproduced by permission of the Linnean Society of London from the engraving of the portrait by J. P. Knight, R.A., in its possession.

Shooter's Hill or Wimbledon Common or somewhere else then still unbuilt-on and reasonably close, breakfasting at a wayside inn before returning to his surgery and proceeding on his rounds. He was a keen attender of the famous field excursions, or herbarizings, long organized by the Society of Apothecaries for its apprentices and at that time at the height of their renown under an instructor of genius, Thomas Wheeler. He surrounded himself with fellow naturalists and microscopists at regular soirées at his house in Wellclose Square. And above all he did what he could to create a garden, though his small backyard offered pathetically little scope, and most of what he put in was quickly choked to death by the appallingly polluted atmosphere.

One day early in 1830 he chanced to notice that in a large bottle loosely covered with a lid in which he had shut up a hawk-moth chrysalis the previous summer (for like most naturalists of the day he also dabbled in entomology) some seedlings had sprung up in a little moist soil that had been left in the bottom. These gradually grew and turned into a fern and a certain common grass. The bottle was transferred to a ledge outside his window and, contrary to his expectation, the

plants went on thriving quite happily with the minimum of air and without ever receiving any water.

Alert to the implications, Ward started experimenting by shutting up a variety of plants in bottles, and he found that in every case they not only survived but showed not the least adverse effect. He therefore had made by a leading firm of nurserymen with whom he happened to be friendly a series of miniature greenhouses, which were made tight with paint and putty and watered no more than once every five or six weeks. Thus was born the Wardian case, one of the most innocently beneficial inventions ever produced.

Autonomous System

The new principle that Ward had stumbled upon was essentially this. If some well-watered soil is shut up with a plant in a more or less airtight vessel, most of the moisture will be indefinitely retained. If in addition the vessel is made of glass, the evaporation given off by the plant itself under the influence of sunlight will join this moisture in condensing on the sides, eventually in the evening dropping down on to the soil like dew. In this way the moisture goes on forming and condensing *ad infinitum*, so that what one has is a completely autonomous, self-regulating natural system. What is more, the atmosphere inside such vessels is kept purified by the presence of the plants, so that animal life too can be indefinitely preserved in them. Ward realized that his cases had this important, subsidiary asset when a robin flew into one, became trapped, and stayed there six months. This gave him the idea of the "vivarium" and, following on from that, the "aqua vivarium," or, as it quickly came to be abbreviated, the "aquarium."

Thanks to his earlier discovery Ward appreciated the crucial role of plant oxygenators, which had eluded zoologists up to that time, and by 1841, years before anyone else—certainly long before Philip Henry Gosse, who is generally credited with the invention—he had a tank in his greenhouse functioning perfectly in accordance with his principle. A friend, J. S. Bowerbank, a banker, a leading microscopist, and an expert on sponges, saw this tank and passed on the idea to the authorities at Regent's Park. It was the monster version that they then erected at the London Zoo that brought the aquarium into fashion.

Meanwhile someone else had made the pilgrimage to Whitechapel and come back amazed by the sight of what by then was a veritable botanic garden under glass, which entirely filled the backyard and had overflowed into the house and up the stairs. This was John Claudius Loudon, the proprietor of the enormously popular *Gardener's Magazine* and, through his compulsive activity as an encyclopaedist, the virtual arbiter of taste to the new middle classes in the matter of their domestic surroundings. Loudon saw the significance of the cases at once. "The success attending Mr Ward's experiments," he subsequently reported to his readers, "opens up extensive views as to their application in transporting plants from one country to another; in preserving plants in rooms, or in towns; and in forming miniature gardens or conservatories . . . as substitutes for bad views, or for no views at all."

Ward himself was taken even more by a further realization: "that the air of London, when freed from adventitious matter, is as fitted to support vegetable life as the air of the country." In other words, behind a protecting shield of glass, even the humblest inhabitant of the city could have ready to hand an unending source of freshness and soothing greenery. Indeed, if only plants could be grown on a sufficiently extensive scale, they might even be used to purify the air and so bring about an atmosphere less inimical to the public health.

However, he was content to leave these causes to others. Genial and relaxed, he was not made of the stuff of crusaders. In any case, the demands of a busy practice left him little enough time to devote to his besetting love, his growing collection of plants. In a literal sense, he preferred to cultivate his own garden.

Fern Cult

For several years all that anyone could squeeze out of him was the briefest of notes explaining the bare elements of the principle. In one case at least an extract from a letter to one of his friends had to do duty even for this. And to persuade him to deliver a paper on the subject at one of the leading scientific forums proved altogether impossible. It therefore fell to Michael Faraday to give the subject its public unveiling, in a lecture at the Royal Institution; to John Lindley to read an account of the discovery on his behalf at the annual meeting of the British Association; and to a member of the staff of the local botanic garden to bring the matter to the attention of the Botanical Society of Edinburgh. The result was that by the time Ward at long last came up with his definitive monograph in 1842³ the contents had been rendered largely stale by this plethora of advance announcements.

Even so Ward was certainly given his due. The trumpeting of praise for him, indeed, spread well beyond these august circles, and nowhere more loudly and more brassily than at the hands of a neighbour of his in Wellclose Square, a young naturalist and journalist named Edward Newman. After 10 frustrating years in the rope business Newman had recently gone off to cleanse himself with a walking tour through Wales; and here, all of a sudden, he had become enraptured by that hitherto neglected group of plants, the ferns. Now, in a widely read book that he felt compelled to write straightaway as a result, he acclaimed Ward breathlessly as "the man who has clothed our courtyards, aye, even our windows, with a perpetual summer." Predictably, the growing of ferns and the acquisition of Wardian cases at once became a minor cult.³

It remained a minor cult for about 10 years. Then, early in the 1850s, three developments took place that caused it to explode into a positive national craze. First, some excellent popular handbooks on ferns with unusually appealing illustrations came out, which stimulated people to go on tours in search of the native species and varieties—and, alas, to dig them up by the hundred and bring them home for cultivation in their windows or their parlours. Secondly, the lifting of the onerous excise duties on glass made this for the first time, quite abruptly, a comparatively inexpensive material. Thirdly, as the *Gardeners' Chronicle* pointed out in a perceptive editorial, a "prevailing taste for exquisitely beautiful foliage" had begun to dislodge from the public favour "merely gaudy flowers"—in step with that wider shift towards the prizing of detail and the elaborately ornate that found expression in contemporary design.

The fern craze led to the Wardian case being mass-produced. At the same time it inexorably meant that it became vulgarized. When the craze spent itself the cases too passed out of fashion. And in that state they lay, virtually unheard of, till a hundred years later, when, in the way of such things, they resurfaced with considerable aplomb under the guise of "bottle gardens."

New Crops

Yet there is one further twist to the story, surely more remarkable and unexpected than all the rest. In 1834, while Ward was still engaged on his initial experiments, a ship arrived from Britain at Hobart, in Tasmania, with several of the new cases on board, the plants they contained manifestly unaffected by the great range of climates they had passed through on the journey out. This was the proof that the authorities at Kew had been waiting for. Thereafter the Wardian case became Britain's grand weapon in the struggle to bring new crops to different parts of the Empire. It was by this means in 1848 that Robert Fortune transferred the first tea plants from China to India, thereby founding the great industry there and making sure of this as our national drink. Later in the same way the introduction of the cinchona tree from Peru to India was accomplished. Later still young rubber trees raised from Brazilian seed at Kew were transported safely to Ceylon and taken thence to inaugurate the vast plantations in Malaya.

And what impact did all this have on Ward himself? Very little, it seems. Certainly he gained not at all financially—even supposing he had wanted to. Totally devoid of vanity, he was content to have made a notable invention and, philanthropist as he preferred to see himself first and foremost, to advocate its utility in the sphere of his own profession: in the wards of hospitals, for example, to raise the spirits of the patients and convey an appearance of freshness.

The original bottle, with its plants still unwatered, made an honoured appearance at the Great Exhibition in 1851. In the following year Ward was elected a Fellow of the Royal Society and two years after that Master of the Society of Apothecaries.

By then he had moved to the more salubrious environment of Clapham Rise, on the south-west side of London, out of the path of most of the capital's smoke. Here the gardening proved less arduous and he lived on happily among his cases till his death in 1868.

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Medical Education

Necropsy Rates in the United Birmingham Hospitals

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British Medical Journal, 1975, 2, 326-328

Summary

The necropsy rate in the United Birmingham Hospitals has fallen from 74.4% in 1958 to 46.0% in 1972. In the Birmingham region as a whole the rate is 27.3%, approximately equal to the national rate.

Most clinicians in the group who replied to a standard questionnaire considered that the necropsy still has an important part to play in their own practice and in undergraduate training, and they viewed the declining rate as a matter for concern.

Some measure of disagreement was found between the ante-mortem and post-mortem diagnoses of patients in the two largest hospitals in the group. This suggests that the necropsy has a role to play in medical audit and that attempts to reverse the declining trend should be encouraged.

Introduction

Until comparatively recently medical practice closely followed the model of the first Parisian school, in which the necropsy had a key role in confirming and interpreting clinical observations. As medical technology has become more sophisticated, interest has become focused more on the microscopic, submicroscopic, and biochemical concomitants of disease and less on gross morbid anatomy. A consequence of this has been a reduction in the number of necropsies performed in hospitals. This has occasioned a considerable debate, particularly among pathologists, many of whom view the trend with alarm.¹⁻⁵ It is frequently stated that the necropsy is an integral part of the medical audit, since it provides the final check on medical

diagnosis and treatment. Proponents of this view point to studies from a number of countries which have shown errors between ante- and post-mortem diagnoses,⁶⁻⁹ and it has been suggested that the necropsy provides more accurate data on which to base epidemiological studies.¹⁰ The discovery of many conditions, including some iatrogenic diseases, has also been credited to the necropsy.¹¹

Against this background we have conducted a study in the United Birmingham Hospitals* which falls into three parts. In the first the necropsy rate was studied and the trend established; in the second the attitude of the clinicians was canvassed by means of a questionnaire; and finally a retrospective study was made of ante- and post-mortem diagnoses in the two largest hospitals of the group.

New Rates

There has been a noticeable decline in the necropsy rate in the group over the period 1958-72 (fig. 1). In 1958 the overall rate was 74.4% whereas by 1972 it had fallen to 46.0%. In the Birmingham region as a whole computer data are available only back to 1968. Nevertheless over the four years 1968-72 the figures show a downward trend from 34.5% in 1968 to 27.3% in 1972. Necropsy rates in the region (excluding the United Birmingham Hospitals) are now almost identical with the national rates given by the Registrar General. It is interesting that the national rates have actually increased slightly since 1958, and though they include data for deaths both in and out of hospital there must be considerable regional variations hidden within the national statistics. Even within the United Birmingham group of hospitals there is a considerable difference in the rates, though all show the same downward trend. The decline in the rate is most marked for patients in the older age groups and is slightly lower in females than in males. In figs. 2 and 3 the rates are shown by sex and age group for the Queen

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* The hospitals in the group are the Queen Elizabeth Hospital, the General Hospital, the Birmingham Children's Hospital, the Birmingham Maternity Hospital, the Birmingham and Midland Women's Hospital, and the Midland Nerve Hospital. The numbers of deaths in the last three hospitals are very small and data from them are not discussed here.