Speech at unveiling of Blue Plaque for Dorothy Hodgkin, 5/5/16

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I am very honoured to have been asked to give this talk at the unveiling of the Blue Plaque to mark the house in which Dorothy and Thomas Hodgkin lived with their extended family. However, there are two people here who, as well as her family members, are far more qualified to give this short account of her life and of this house: Georgina Ferry, Dorothy Hodgkin's biographer, and Eleanor Dodson who worked with Dorothy in Oxford on the 3-dimensional structure of insulin, and who visited the family here many times in the 1960s.

Dorothy Crowfoot Hodgkin (DCH) was a famous scientist and pacifist, being a leader and innovator in her field, and President of Pugwash for 12 years. She won the Nobel Prize in Chemistry in 1964 for her use of crystallography to find out the three-dimensional shapes of penicillin and Vitamin B12. In 1969, 35 years after she had been given some insulin crystals and through enormously tenacious and brilliant work, she solved its 3-D structure. Insulin is an important hormone used by the body to process sugars in food and knowledge of its shape helped untangle the mechanism of its action, with critical implications for diabetes control.

DCH's pioneering work in crystallography gave birth to a whole new field of applying the methods to large biologically important molecules, including DNA and proteins. What are proteins? They are the molecules that, among many other functions, allow us to store energy, transport oxygen round our body and digest our food. They are made up of 20 `amino acids' formed from atoms of hydrogen, carbon, nitrogen and oxygen (2 out of the 20 also contain a sulphur atom). These 20 acids occur naturally in our bodies and form long strings, just like this string of beads I am holding, where every bead represents an amino acid. Chemists can tell us which of the amino acids are at which position by 'sequencing' the protein molecule, but we cannot quite yet use a computer to find out how the string will wrap up in 3-D like wet spaghetti.

The way we find out this 3-D shape is by growing tiny (usually less than a tenth of a millimetre) crystals of the protein. Imagine a parade of soldiers in rows all facing the same way, but also stacked on top of each other. Each soldier represents one protein molecule. We then hit this ordered array with a very intense beam of X-rays, and due to interference effects we see a pattern of spots on an X-ray detector placed behind the crystal, the so called 'diffraction pattern'. We rotate the crystal in order to look at the `soldier' from all sides, and after doing some fairly complicated mathematics, we can eventually get a picture of the density of electrons in the molecule in 3-D space. We can then, using computer graphics, build the known sequence into the experimental results and get the 'fold' of the protein. With J.D. Bernal, DCH discovered that it was absolutely essential to keep protein crystals wet with their growth liquid ('mother liquor') while irradiating them. This is because our soldiers are effectively in a swimming pool, and the spaces between them are full of the growth liquid. If the liquid dries out, the soldiers (molecules) start to lose their arrangement as an ordered array, and when hit with X-rays, they do not give a good pattern of spots. We now know the 3-D shapes of over 113,000 biological molecules, and all the information is

stored in an open access database called the Protein Data Bank. This is our legacy from the work of great scientists such as Dorothy Crowfoot Hodgkin.

But what about this house, 94 Woodstock Road, that we are here to commemorate?

Dorothy and Thomas lived here from 1957 to 1968 with their 3 teenage children, Luke, Liz and Toby, as well as Dorothy's sister, Joan Payne with her 5 children Jill, Nicki, Bas, Sue and Vicky. This made 3 adults and 8 children so there was always a lot going on, and Joan was in charge of imposing order on the whole household. In fact she was the unsung heroine of the family's life here, and she also worked part time in the Ashmolean Museum cataloguing the Egyptian and Nubian collection. Joan was later awarded an honorary MA by Oxford University for her contribution to the Museum. She was still inventing and constructing machines to help her with her research into the effect of friction wear on flints when she was 94.

In the house there were 6 bedrooms and 2 more rooms in the attic. In one of these there was a lab equipped with Bunsen burners and test tubes. Crystals were grown and rocket fuel was manufactured! Visitors, of whom there were many, some of whom were refugees, were made very welcome at the house, and twice included Linus and Helen Pauling. One guest visiting from Cambridge reported counting 17 toothbrushes in the bathroom!

Bicycles were kept in the hall and the front door was not locked. It was thus easy to break in, as some of the children discovered when they got shut out one night. On the 1st April one year, 'a tribe of teenagers' from the house sabotaged the piano at the Oxford High School by inserting Meccano into the works! There was a large garden which was well used by the children. Two evacuees lived in the cottage at the end of it and helped Joan in the house.

A poignant memory from the family is of Dorothy Hodgkin sitting in the kitchen with a far-away look in her eyes surrounded by crowds of loudly talking children. I am very grateful to the Hodgkin and Payne families for sending me some 'Memories' of this house that they have recently collected, and the above account stems from these.

Thus this Blue Plaque very appropriately commemorates a great scientist and a wonderful human being, along with the family who made this house their home, and many of whom are here today.