However, there are already enough clues to justify further investigation of the non-cholinergic biochemical and physiological functions of the cholinesterases. The possible involvement of cholinesterases in cell growth and movement has far-reaching implications for our understanding of the maturation of cells in the nervous system and blood.

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References

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Although studying Creighton’s Proteins: Structures and Molecular Properties, a required text for the course in biomolecular structure at the University of Wisconsin, I discovered that a short model of a polypeptide chain which I had built could not be oriented so that it corresponded to the diagram of β-sheet structures. Neither the parallel nor the anti-parallel drawings would fit my model, so I checked the model for the proper L-amino acids. Finding it to be correct, I soon discovered that both β-sheet diagrams in Creighton are drawn with D-amino acids.

These diagrams were adapted from Pauling's The Nature of the Chemical Bond. I assumed that Creighton’s diagrams had been inadvertently reversed during publication, but to my surprise, the β-sheet structures in Pauling’s great text are drawn with D-amino acids. This apparent error prompted me to examine the original papers.

The first proposal of β-sheet structures was made by Pauling and Corey in 1951. During the same period of time, Pauling, Corey and Branson proposed two hydrogen-bonded helices, one of which has become known as the right-handed α-helix. This work was based upon model building which incorporated the authors’ knowledge of the planar peptide bond, bond angles, and bond lengths. In each of these papers the authors were discussing L-amino acids, but the diagrams contained what we now designate D-amino acids. However, in the publication on helical structures the authors state: ‘An arbitrary assignment of the R groups has been made in the figures’. At the time of this initial work in 1951, the absolute configuration of the amino acids was not known, and the authors made a random guess that was later shown to be incorrect.

Around this same time, Bijvoet and co-workers developed the method of isomorphous replacement for X-ray crystallography which enabled them to determine the absolute configurations of a wide range of optically active compounds, many of which could be related, by chemical methods, to the naturally occurring amino acids.

In 1955, Pauling, Corey and Marsh published a paper on the structure of silk fibroin. In this paper, the diagram of the anti-parallel β-sheet was drawn with the correct configuration of L-amino acids which corresponds to S (except for cysteine) in the R/S system of Cahn, Ingold and Prelog.

This shows that the papers published in 1951 and 1955 by Pauling and colleagues were correct in their representation of β-sheet structures: in 1951 because the absolute configuration of amino acids had not yet been determined, and in 1955 because they cor-
Figure 1

β-sheet diagram drawn with L-amino acids; reproduced, with permission, from Ref. 9.

Figure 2

β-sheet diagram drawn with D-amino acids; reproduced, with permission, from Ref. 1.

Acknowledgements

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Erratum

In the article entitled 'Tissue-specific genes for respiratory proteins' by Margaret I. Lomax and Lawrence I. Grossman (TIBS 14, pp. 501–503), Table I contained two errors. The two cytochrome c oxidase subunits COX4 and COX6A are both located on human chromosome 16 and not chromosome 15.