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CC/NUMBER 20
MAY 18, 1987

Cochran W, Crick F H C & Vand V. The structure of synthetic polypeptides. I. The transform of atoms on a helix. *Acta Crystallogr.* 5:581-6, 1952.
[Cavendish Laboratory, Cambridge, England and Chemistry Department, The University, Glasgow, Scotland]

Formulae were given for the X-ray diffraction patterns of helical structures, and evidence was provided that the structure of a synthetic polypeptide was based on the α-helix of Pauling and Corey. [The *SCI*® indicates that this paper has been cited in over 375 publications since 1955.]

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February 17, 1987

This work was done 35 years ago! In 1951 I had just received my first tenured appointment as a physics lecturer in Cambridge. Francis Crick was a research student in the Medical Research Council Unit of the Cavendish—he had come late into physics research. Vladimir Vand was a research fellow in Glasgow, whom I had met but did not know well. For me the story began when, without much expectation of being able to interpret them, I took some X-ray photographs of a specimen of poly-γ-methyl-L-glutamate that my professor, Sir Lawrence Bragg, had obtained from another research group. My diary for October 2, 1951, notes: "The Prof shows a touching faith in my ability to extract a complicated crystal (*sic*) structure from almost no data"—the material was only semicrystalline, and I was used to looking at crystals. A month or so later Bragg received, possibly as a referee, a paper by Vand on the theory of X-ray diffraction by helical structures. He passed it on to me, and I concluded that Vand's answer was correct for a continuous helix but not for atoms on a helix. Crick also saw the paper, and when we compared notes the following day, we found that we had arrived at the same (correct) answer by different routes. A few days later I suddenly realised that the photographs of poly-γ-methyl-L-glutamate, which I had put aside, could be explained as the diffraction pattern of atoms on helices of different radii. The structure turned out to be based on the α-helix of Linus Pauling and Robert B. Corey.[1] It was, I believe, the first fairly conclusive experimental evidence for the existence of a helical structure at the molecular level, and Crick and I published a short note on the subject.[2]

The main value of this work, seen in retrospect, is that it was a first step on the road to the discovery of the structure of DNA by Jim Watson and Crick.[3-5] The first I knew of that work was when Crick arrived excitedly in my office to take me to see the model of a double helix that they had built. Actually, it was their first and incorrect version, but I would not have been more impressed by the correct version—I had not seen the experimental evidence contained in photographs of B-type DNA, and I distrusted "speculation." It was some time before I gradually became convinced of their tremendous success.

[The α-helix has now been recognized as a feature of the majority of protein structures, and a vast industry of protein crystallography has developed.[6,7]]

1. **Pauling L & Corey R B.** The structure of synthetic polypeptides. *Proc. Nat. Acad. Sci. USA* 37:241-81, 1951. (Cited 105 times since 1955.)
2. **Cochran W & Crick F H C.** Evidence for the Pauling-Corey α-helix in synthetic polypeptides. *Nature* 169:234-5, 1952.
3. **Watson J D & Crick F H C.** A structure for deoxyribose nucleic acid. *Nature* 171:737-8, 1953. (Cited 1,235 times since 1955.)
4. **Watson J D.** *The double helix: a personal account of the discovery of the structure of DNA.* (Stent G S, ed.) New York: Norton, 1980. 298 p.
5. **Watson J D & Tooze J.** *The DNA story: a documentary history of gene cloning.* San Francisco: Freeman, 1981. 605 p.
6. **Wyckoff H W, Hirs C H W & Timasheff S N,** eds. Diffraction methods for biological macromolecules. A. Preface. *Meth. Enzymology* 114:R11, 1985.
7. ———. Diffraction methods for biological macromolecules. B. Preface. *Meth. Enzymology* 115:R9, 1985.

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