

CALIFORNIA INSTITUTE OF TECHNOLOGY

PASADENA, CALIFORNIA 91126

DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING
THE CHEMICAL LABORATORIES

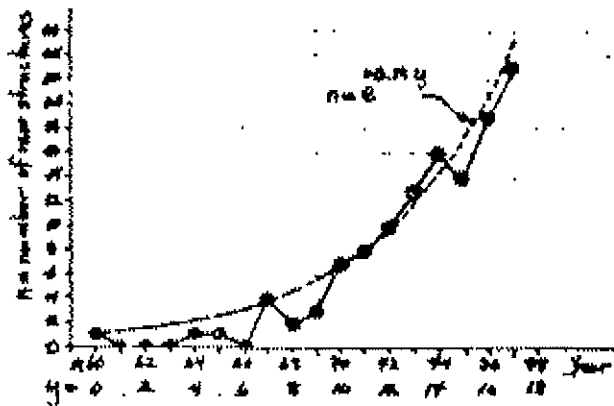
1 September 1978

The first draft of the table of protein crystal structures for Dickerson and Geis, "Proteins: Structure, Function and Evolution" is now complete, and individual sections have been sent out piecemeal to protein crystallographers for checking. I am sending this letter both as a progress report and a reminder that I hope you will check your sections carefully for errors or omissions, and return them to me as soon as you can. With these corrections in hand I shall revise the table, and then will send copies of the entire table to everyone who responded.

In the meantime, you may be interested in some statistics on protein crystal structure analyses, following Brian Matthews' lead in his 1976 Annual Reviews of Physical Chemistry article. To mid-1978 there have been 132 protein structure analyses reported in the literature at a resolution high enough to permit a complete tracing of the polypeptide chain. The table below shows these on a year-by-year basis.

| | | | | | | | | | | | | | | | | | | | |
|-----------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----------------|
| Year: | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78(Incomplete) |
| No. structures: | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 4 | 2 | 3 | 7 | 8 | 10 | 13 | 16 | 14 | 19 | 23 | 10 |
| No. (Matthews): | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 4 | 2 | 5 | 6 | 12 | 9 | 10 | 13 | 15 | -- | -- | -- |

My numbers and Brian's differ in detail because I have not counted meeting abstracts as publications, and have listed the Cold Spring Harbor papers in their year of publication (1972) rather than their year of presentation (1971). Since every protein structure is actually solved one to three years (or more) prior to journal publication, this policy is at least internally consistent for all. I have also included variants such as azide-myoglobin and the different oxidation states of flavodoxin, and classed tRNA as a "protein" since the structure analyses are similar.



The number of new structures appearing per year is rising exponentially, as shown in the plot at the right. It can be fitted well by the expression: $n = \exp(0.19 y)$. The last four years have average one new structure every three weeks! If this exponential growth were to continue, by 1991 we would see one new protein structure every day, and Geis and I would give up in despair. Even today, with 132 structures, it is a surprise to realize that the 1968 "Structure and Action of Proteins" had the benefit of only eight high-resolution structures.

The current book will require a formidable amount of both compression and selection. It cannot be encyclopedic and remain either a textbook or a book that can be picked up by one person. I hope that I shall not offend everybody by leaving out what each considers the essential facts about the most essential protein of all (his). The table of protein structures will at least be one place where the entire story can be outlined.

Dick Dickerson
Dick Dickerson