

Elucidation of the amino acid sequence of the Insulin B-chain

Sanger & Tuppy (1951)

The first problem of Problem Set 4 reads:

PS4.1. Use only the results of Sanger and Tuppy (1951) [Biochem J 49:463-481] to deduce as much of the structure of insulin you can. Do this as if it were a geometric proof, appealing to lines within the tables (axioms) and truths you derive from them (theorems). For example:

<u>Assertion</u>	<u>Justification</u>
A. Thr-Pro*	Table 6, Line 8
B. Thr-(Ala,Lys,Pro) [¶]	Table 9, Line 6
C. Only one Pro	Table 14
D. <u>Thr-Pro-(Ala,Lys)</u>	<u>A+B+C[†]</u>

*Meaning "Thr is immediately to the left of Pro somewhere in the polypeptide chain"

[¶] Meaning "Thr is immediately to the left of Ala, Lys, and Pro (in some unknown order)"

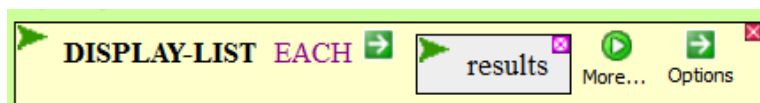
[†] Meaning "The assertion on this line follows from the assertions on lines A, B, and C"

This essentially asks you to take all the data from Sanger & Tuppy (1951) and recreate their chain of reasoning that led to the sequence of insulin (to the extent they got there). This is entirely do-able, but takes a while. Big scientific problems don't take a while – they take forever, for an individual – so they're generally solved by communities. Even though **PS4.1** isn't too big of a scientific problem, we can still approach it in that spirit.

Accordingly, I've divided you into four working groups, giving each person an area of expertise:

<p style="text-align: center; margin: 0;"><u>Group 1:</u></p> <p>Catherine - Glu (4) Chris – Val (3) Darrell – Tyr (1) Kamran – His (2) Skyler - Gly (5)</p>	<p style="text-align: center; margin: 0;"><u>Group 2:</u></p> <p>Ramey - Gly (4) Akhil - Val (1) Farrah - Asp (3) Rae - Ser (2)</p>	<p style="text-align: center; margin: 0;"><u>Group 3:</u></p> <p>William - Leu (4) Gelila – Phe (3) Rachel – Cys (5) Megan – His (2) Pedee - Arg (1)</p>	<p style="text-align: center; margin: 0;"><u>Group 4:</u></p> <p>Mazin – Leu (5) Jordan – Ala (4) Kiyante – Pro/Thr (1) Nav – Glu (2) Wesal – Lys (3)</p>
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Each person is associated with an amino acid. That person should consider all experiments from Sanger & Tuppy (1951) that bear on the amino acid, deducing all that's possible from the results, in the form shown in Problem 1, above. When you are satisfied by a non-trivial deduction, publish it, by sending it to me. I will post it to CyanoBIKE. You can see what has been published by executing the following function within CyanoBIKE:



You can communicate freely within your group and can communicate with other groups by means of *seminars*. In a seminar, a member of the group contacts another group and tells them an interesting result (e.g. "My group has found that there is a Val-Met-Phe peptide in insulin"). In return, the seminar speaker can ask a specific question (e.g. "We think that Phe is next to either Ala or Ser, but we're not sure which. Do you have any information on this?"). The seminar speaker then reports back to the group what of interest s/he heard. Only one speaker may go out at a time. The red numbers next to the names indicate the order of seminar speakers sent out by the group.