CRC for Premium Quality Wool

The Molecules of the Wool Intermediate Filaments (the "Low-sulfur Proteins")

Produced for the CRC for Premium Quality Wool undergraduate program by;
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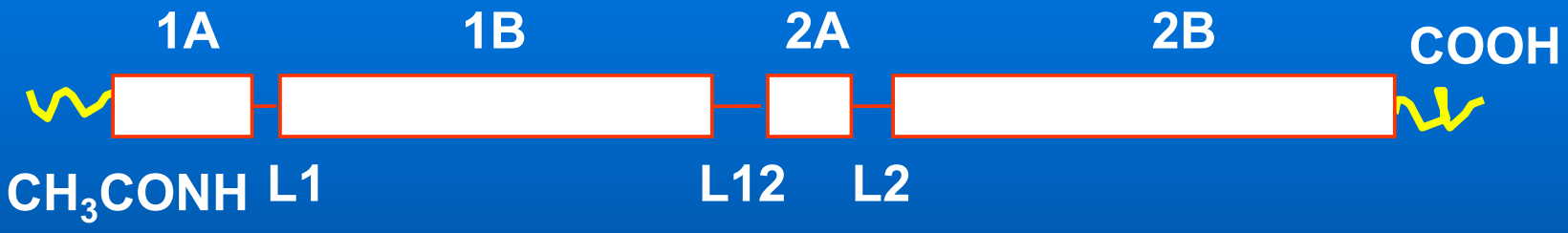
Low sulfur protein molecule

- consists of a single protein chain
  - central portion forms 4 right handed alpha-helices (1A, 1B, 2A, 2B) joined by 3 non-helical link regions (L1, L12, L2).
  - C- and N-terminal regions are non-helical



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Variation in the low sulfur protein molecules in wool

- 8 types of low sulfur molecules
  - similar in size and amino acid sequences
  - different in N-terminal and C-terminal regions
- 2 groups
  - Type I
    - K1.n or 8a, 8b, 8c-1, 8c-2
  - Type II
    - K2.n or 5, 7a, 7b, 7c

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Hair Keratin IF

- Hair keratin type I IF
  - acidic
  - 392 - 416 amino acids
  - 4-6 proteins
- Hair keratin type II IF
  - neutral-basic
  - 479 - 506 amino acids
  - 4-6 proteins

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Wool Keratin IF Type II Proteins: Comparison of C-Terminal Domains

7a	K2.9	I	A	T	Y	R	R	L	L	E	G	Q	E	Q	R	L	C	E	G	V	G	S	V	N	V	C	V	S	S	S	
7c	K2.10	*	*	*	*	*	*	*	*	*	*	E	*	*	*	*	*	*	*	*	*	A	*	*	*	*	*	*	*	*	*	
7b	K2.11	*	*	*	*	*	*	*	*	*	*	E	*	*	*	*	*	*	*	*	*	A	*	*	*	*	*	*	*	*	*	
5	K2.12	*	*	*	*	*	*	*	*	*	*	E	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	

	K2.9	R	G	G	V	V	C	G	D	L	C	V	S	G	S	R	P	V	T	G	S	V	C	S	A	P	C	S	G	N		
	K2.10	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	K2.11	*	*	*	*	*	*	*	*	*	*	A	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*		
	K2.12	*	*	*	*	A	*	*	G	*	T	Y	*	S	T	A	G	R	Q	I	A	S	G	P	V	A	T	G	*	S		

	K2.9	L	A	V	S	T	G	L	C	A	P	C	G	P	C	N	S	V	T	S	C	G	L	G	A	G	G	V	G	S		
	K2.10	*	*	*	*	*	*	*	*	*	*	*	*	Q	L	*	T	T	C	G	G	*	S	C	S	L	*	R	C		-COOH	
	K2.11	V	V	*	G	*	S	D	V	C	S	P	C	S	R	V	G	G	S	I	L	*	C	K	K	C					-COOH	
	K2.12	I	T	*	L	A	P	D	S	C	Q	P	R	A	S	S	F	S	C	G	S	S	R	S	V	R	F	A			-COOH	

	K2.9	C	G	I	S	S	Y	G	V	G	S	C	A	S	V	C	R	K	C												-COOH	

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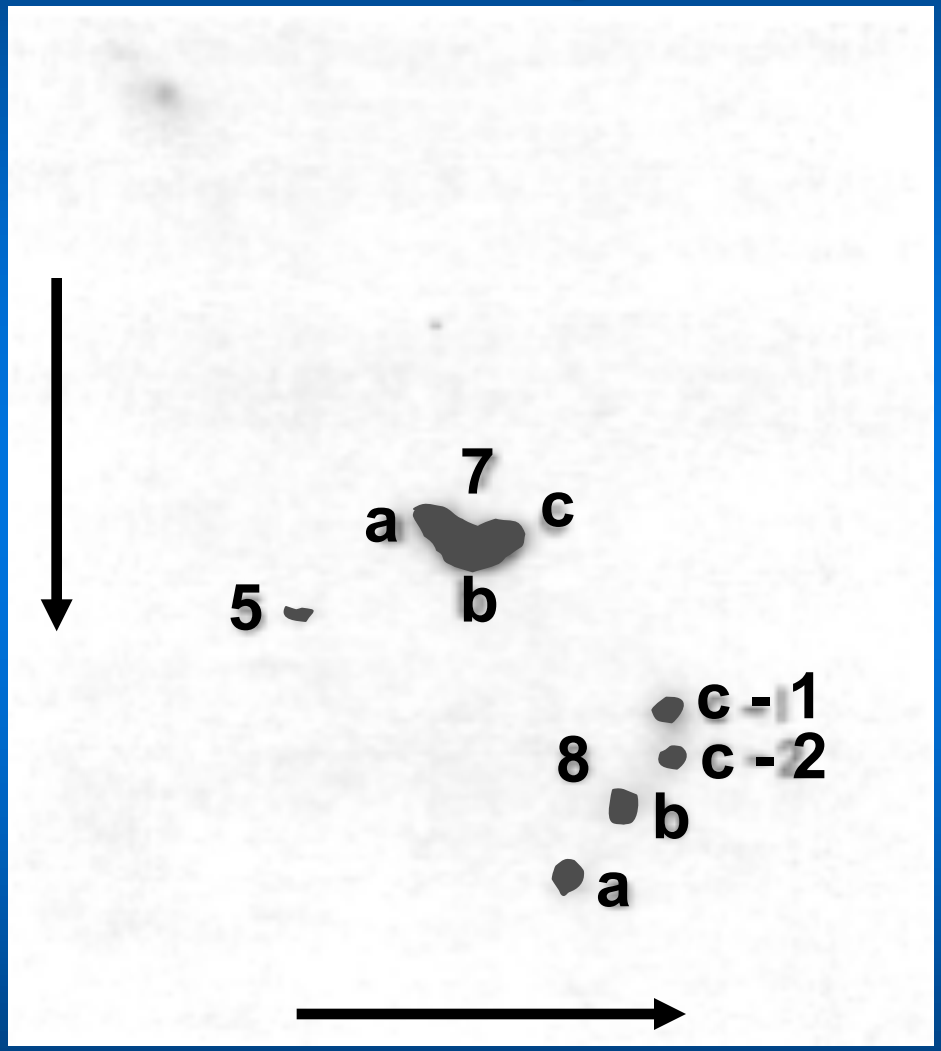
Low S wool proteins prepared at neutral pH



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Source: J. M. Gillespie, (1990)

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Number of amino acid residues in 4 wool IF protein sequences

	N-terminal	1A	L1	1B	L12	2A	L2	2B	C-terminal	Total
Component 7c	109	35	10	101	17	19	8	121	71	491
Component 5	122	35	10	101	17	19	8	121	70	503
Identities	55	31	8	84	16	18	8	113	25	
Component 8c-1	55	35	11	101	16	19	8	121	46	412
Component 8a	55	35	11	101	16	19	8	121	46	412
Identities	48	35	10	86	16	19	8	114	38	
No. of α-hēlical turns		10		28		5		34		

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Source: D. A. D. Parry (1997)