

Salk Thursday  
23<sup>rd</sup> Sept 76

Chromatin

Introduction

Mainly on Structure.

Chromatin: def. DNA, histones, non-histone p. RNA. etc.

The 5 Histones. H<sub>1</sub>

<u>MW</u>	H4 } H3 }	H2A } H2B }
sequence conservation.		

molar ratio?  
amino acids per DNA?

will ignore modifications.

The mini-chromosome of SV 40.

circular DNA.

prob. only the 4 histones.

Jack Griffith : diameter ~ 120 Å \_\_\_\_\_ S

length of DNA (~1.7) <sup>(125)</sup> \_\_\_\_\_ S

the string of beads \_\_\_\_\_ S

number of beads (~21)

~~also~~ more recent work: Chantson

Yakov.

ALSO ~~Olins~~ Olins and Olins (Nov 1955)

Early x-ray studies <sup>(2)</sup> Pardee + Wilkins. (10, 55, 31), 27<sup>A</sup> cm.  
interpreted as a supercoil. Bredberg neutron diffraction showed  
no mainly due to protein.

### The Breakthrough

Hewitt and Bergoyne.

DNA endonuclease SalI endonuclease. (light digestion) over under?  
purified, d.s. on acrylamide gels.  
bands ~ 200, 400, 600, 800 bp. etc.  
(rather broad bands).

① established approx MW  
strand ~~over~~ ② should show DNA in these structures.

Markus Holl (also <sup>Ker</sup> van Holde)

micrococcal (Staphylococcal) nuclease:

gave similar results. ker structure 157 ± 5p.

showed (heavy) shearing ~~and~~ muddled the pattern.

Haltz: The H S particle is with histones one.

Success gradient.

The 1. 2. 3, 4 exp. \_\_\_\_\_ S

~~Further digestion~~ 1100 <sup>core</sup> ~~particle~~ particle  
particle particle particle particle

The Kornberg model (histone interactions) Kornberg + Thomas  
H3 H2 H1 H3 H2 H1

Amount of DNA : 200 bp  $\approx$  2 x 4 histones + H1

Thus the bead (= chromatin) = nucleosome

postulated to have this structure. size  $\approx$  (100 Å)<sup>3</sup>  
(110 Å)

More recent results

The variation in the 200 sp.

Aspergillus, yeast & neurospora ~ 170 sp

Chlo cells . Lee Guxton (London) ~~170~~ 180 sp

Same in microphase as in metaphase

chick red cells . Pen Moni 205. (570 layer)

~~Chlo~~ Sec actin sperm. 240 sp Chamber

germ. 220 sp.

Rabbit brain Jean Proust. ~~neuron~~ 175-180 sp

glia. 195-200 sp.

The 1100 sp core peptide

'pau' is micrococcal digestion.

So far, same in all peptide material studied

to linker varies.

Crytallisation of peptide Russian group. Varslavsky & Georgiev.

small for X-ray powder diagram

Klug & Alexander: small .. electron picture (110 Å) — S

larger. single crystals: to 20 Å.

[Proust]

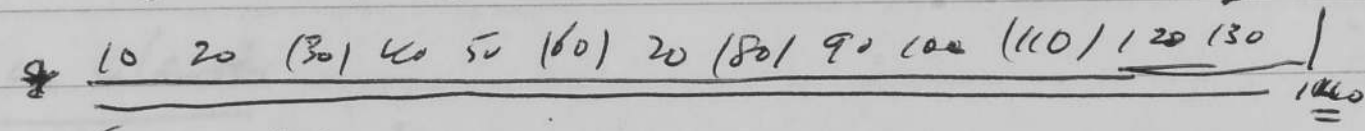
Second Surprise

DNAse I digestion      Markers roll

loops digested      same      30, 40, 50      80      120 (130) (140) ...  
for SS DNA.

Then appeared to be "every" \* 10 bp (60 bp per turn).

Let later : remain kinked  
de assumption of a dyad S



Then implies cuts <sup>cut (or no cut)</sup> are close together on the structure.

~~Curved~~  
Curved or kinked ? kink with no bases unpaired.  
~~integer argument.~~

Crick & King kink S  
(Hank) Sobell kink. PNAS ~~sketch~~

evidence for kinks : integer argument      80 (over 75 etc).

Number of supercoils : is crisp clashed by Brock Fuller (Cal  
Tex)

for SV40 (or no k1)  
measurements suggest ~ 1/2 per nucleosome.  
but difficulties about reference state.

meaning : explanatory paper in Arizona PNAS  
more disjoint between Twist and Linking number.

