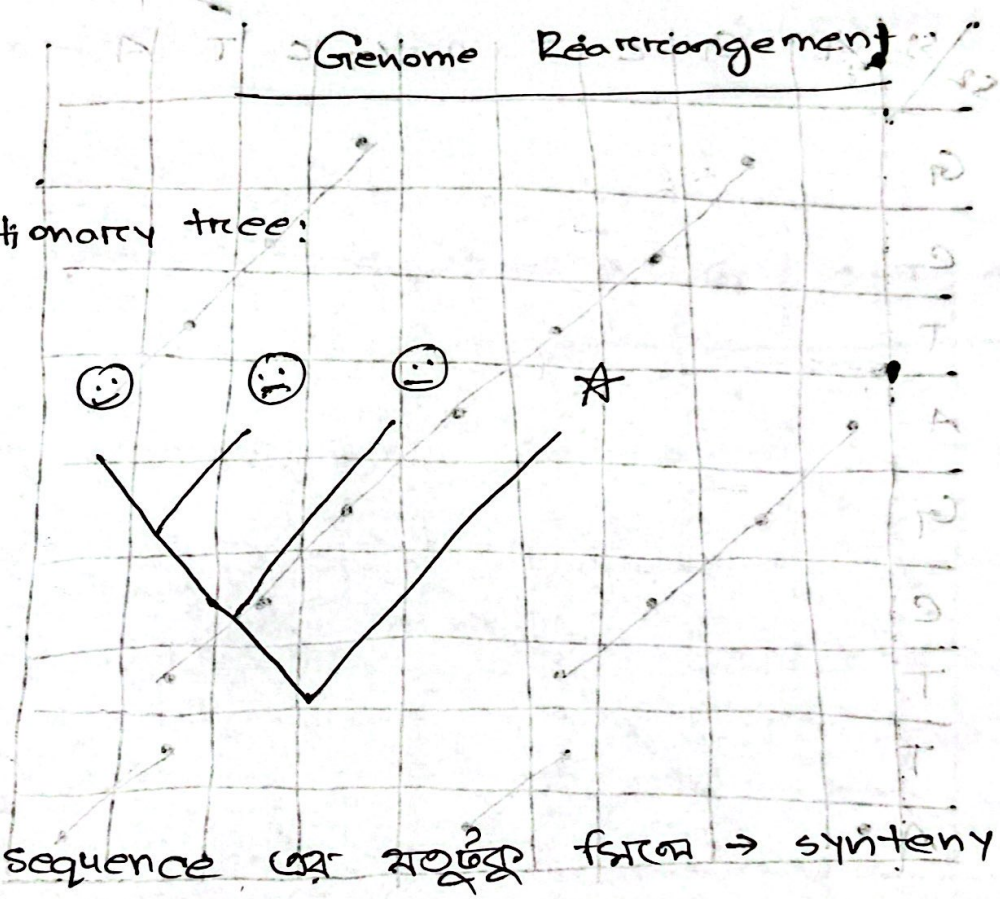
BIE

DNA is negative charged :

Diversity of life :

Genome Rearrangement

Evolutionary tree :



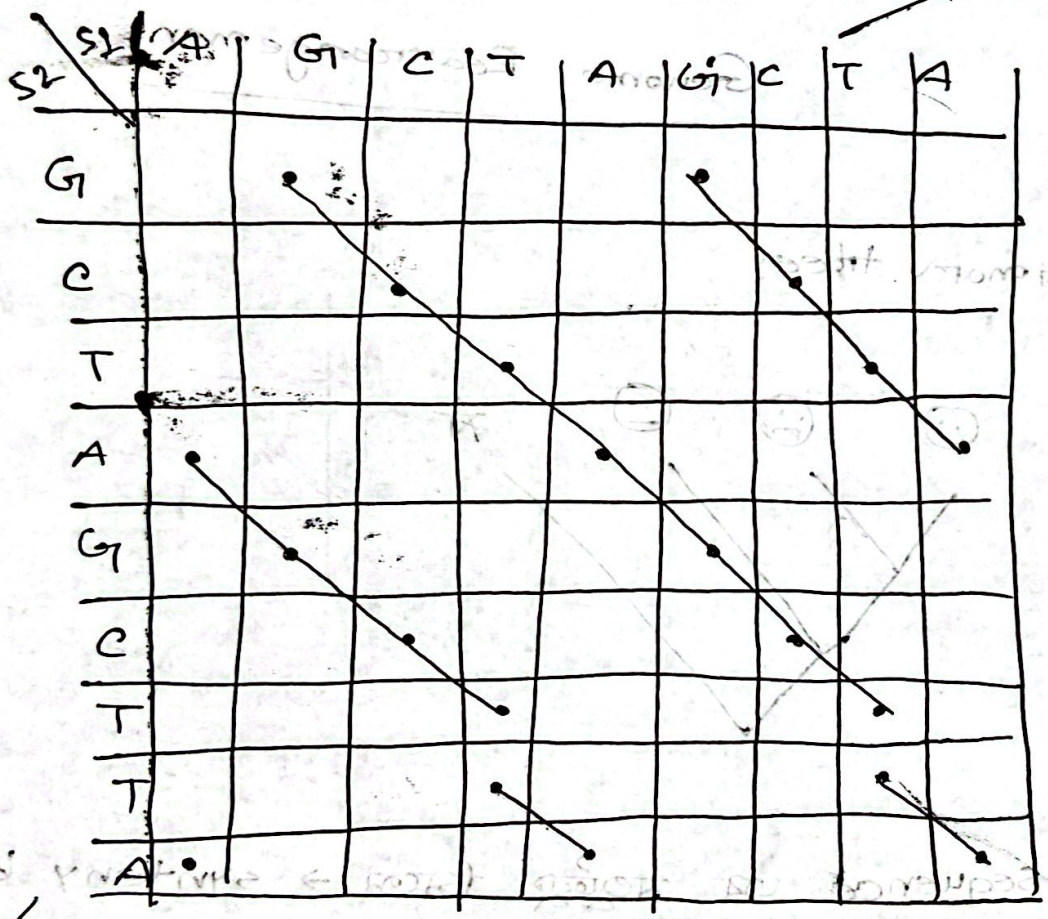
Genetic sequence এর সংযুক্তি থেকে → synteny blocks

Dot plot :

Genome dot plot

Sequence 1 : AGCTAGCTA

Sequence 2 : GCTAGCTTA



* কয়টা primary diagonal or তার parallel line আঁকা যায়

যদি কোনোকিছু বলা না হয় তাহলে three-shold value 2.

. যদি threshold value, 3 দেওয়া থাকে তাহলে synteny value 3.

এইটায় synteny value ৫.

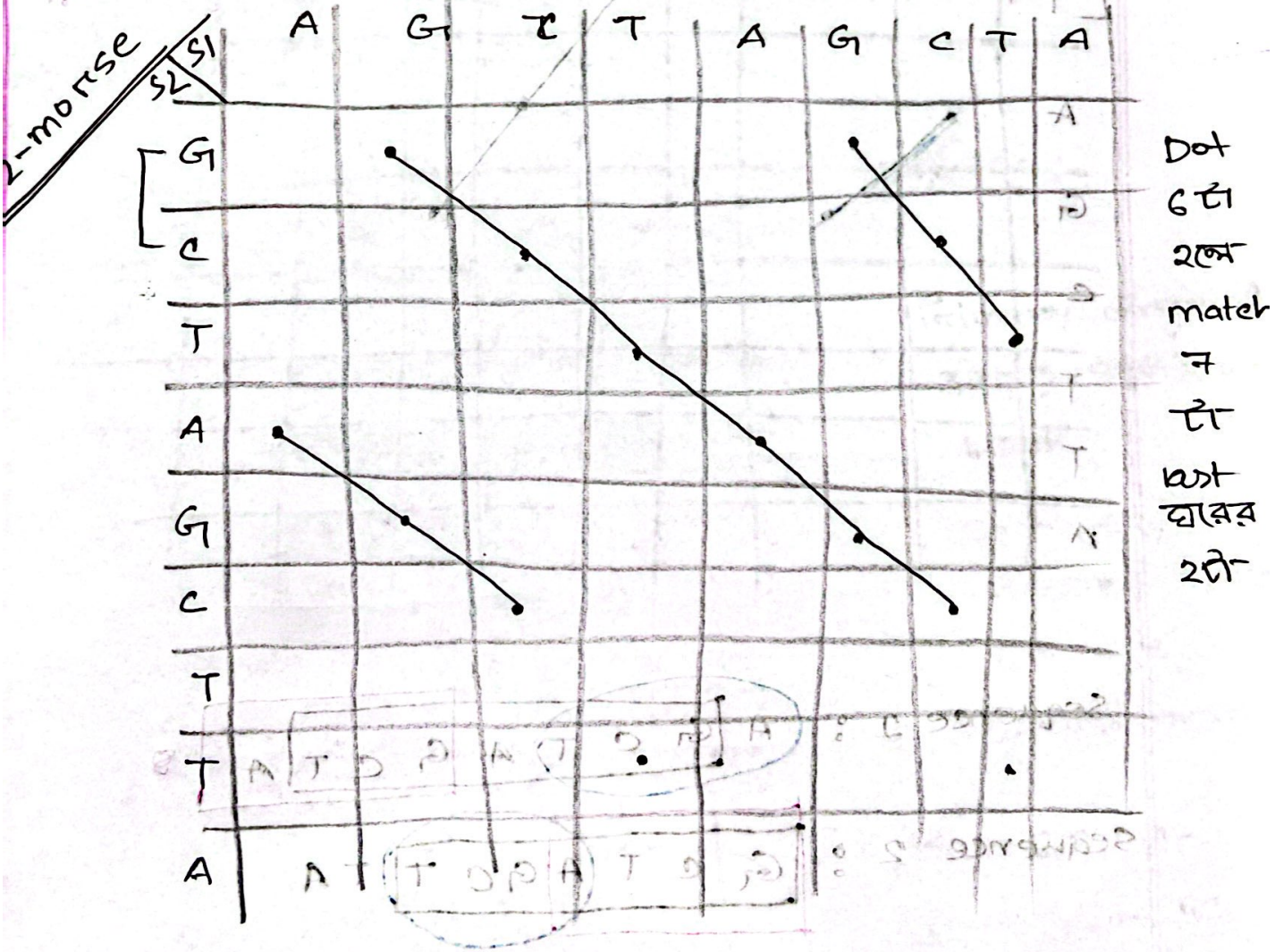
K-morse Algorithm:

match substrings of length K.

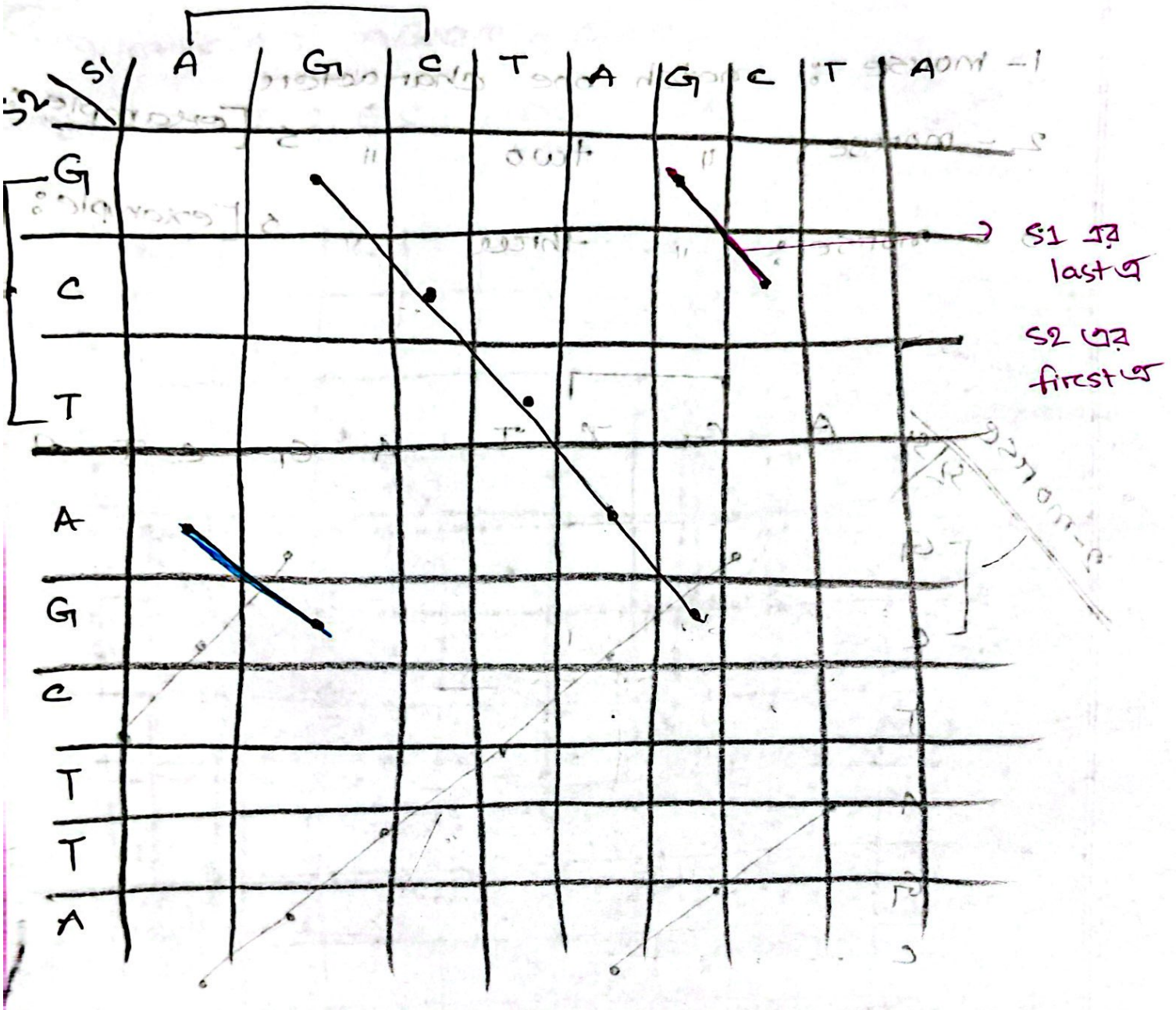
1- morse : match one characters

2 - morse : " two " [example: AGCTT

3 - morse : " three " [example: AGCTT



3 morse :



Sequence 1 : A G C T A G C T A

Sequence 2 : G C T A G C T T A

Reverse Complement:

S1 : AGCTAGCTA

Reverse : ATCGATCGA

Complement : TAGCTAGCT

Revert :

S1 : TTATCTAC

S2 : AGATAAC

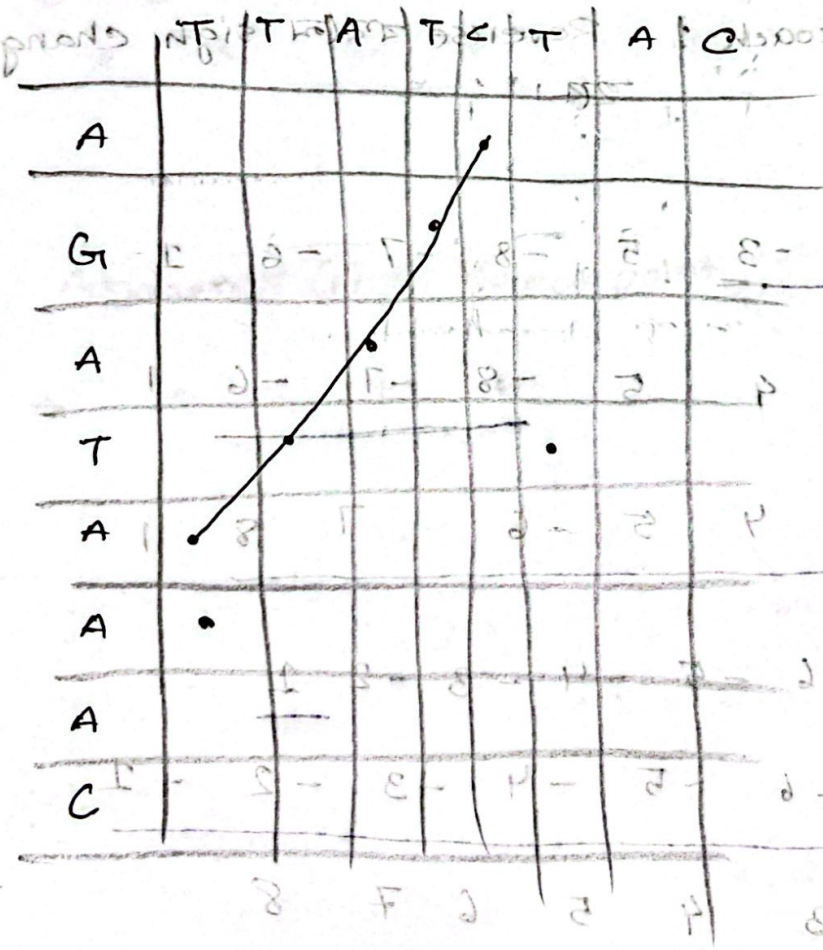
Complement

A কে T বসবে

G কে C ,,

C ,, G ,,

2morse :



Primary diagonal বরাবর synteny block

Secondary diagonal বরাবর reverse complement.

AG → GA → CT

GA → AG → TC

AT → TA → AT

TA TA

AA TT

AC → CA → GT

Reversal : একটা certain syntony block এর অর্ডার reverse করে দেয়া

$\pi = 1, 2, 3, 4, 5$

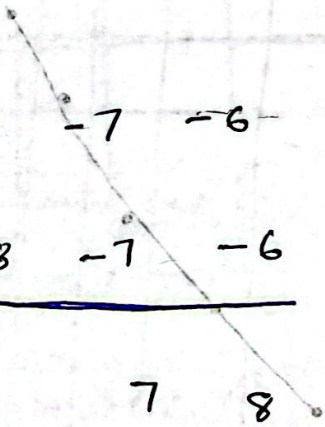
$\rho(3,5) = 1, 2, -5, -4, -3$

Pancake Flipping Problem :

Permutation : অর্ডার (কীভাবে সাজানো থাকবে)

minimum সংখ্যক reversal দিয়ে π permutation.

Greedy Approach : Reverse করলে sign change হবে।



+2 old -4 -3 5 -8 -7 -6 1

→ 2 3 4 5 -8 -7 -6 1

→ 2 3 4 5 6 7 8 1

→ -8 -7 -6 -5 -4 -3 -2 1

→ -8 -7 -6 -5 -4 -3 -2 -1

→ 1 2 3 4 5 6 7 8

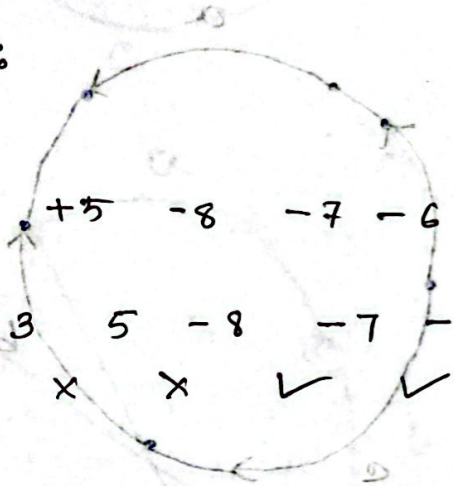
Adjacencies & Break point :

$P_{i+1} - P_i = 1 \rightarrow$ Adjacency

$P_{i+1} - P_i \neq 1 \rightarrow$ Break point

যেকোনো একটা sequence এ যেকোনো একটা number থাকবে তার থেকে আগের number minus করলে

এর জন্য first এ 0 add করতে হবে and last এ n+1 add করতে হবে :



2 -4 -3 +5 -8 -7 -6 +1

0 2 -4 -3 5 -8 -7 -6 1 9

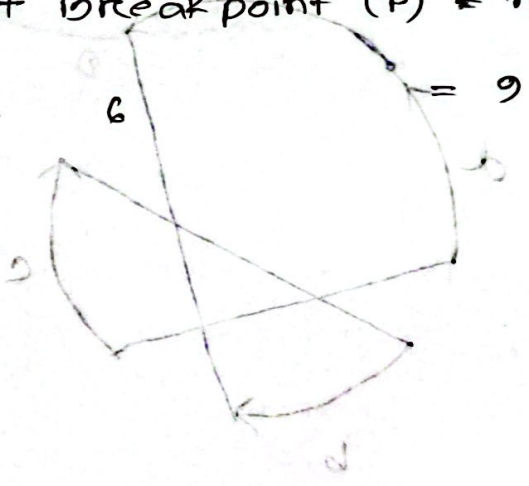
X X ✓ X X ✓ ✓ X X

✓ → Adjacency

X → Break point

Adjacency (p) + Break point (P) = n+1

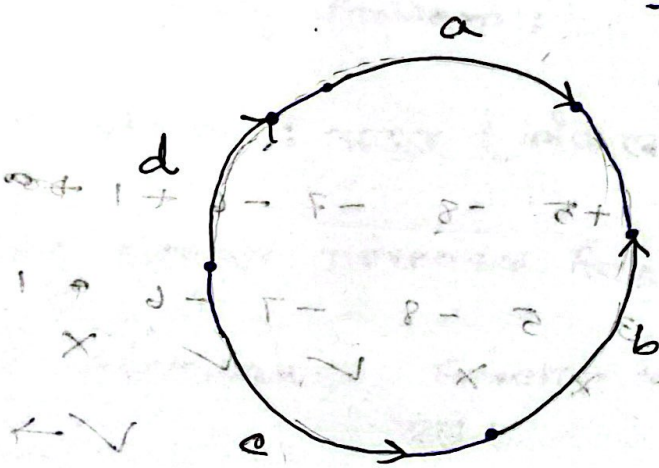
⇒ 3 + 6 = 9

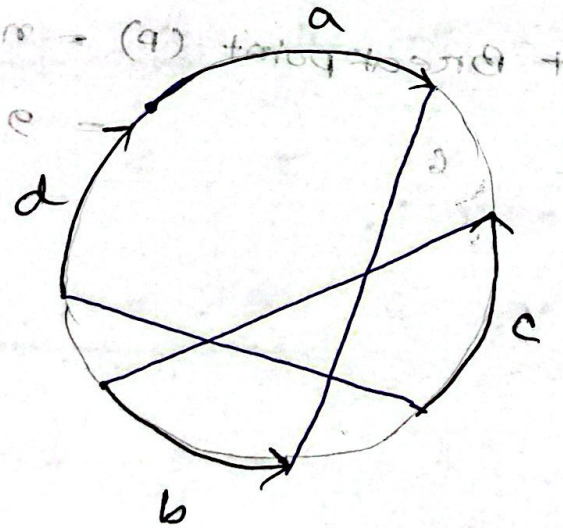


Genome graph:

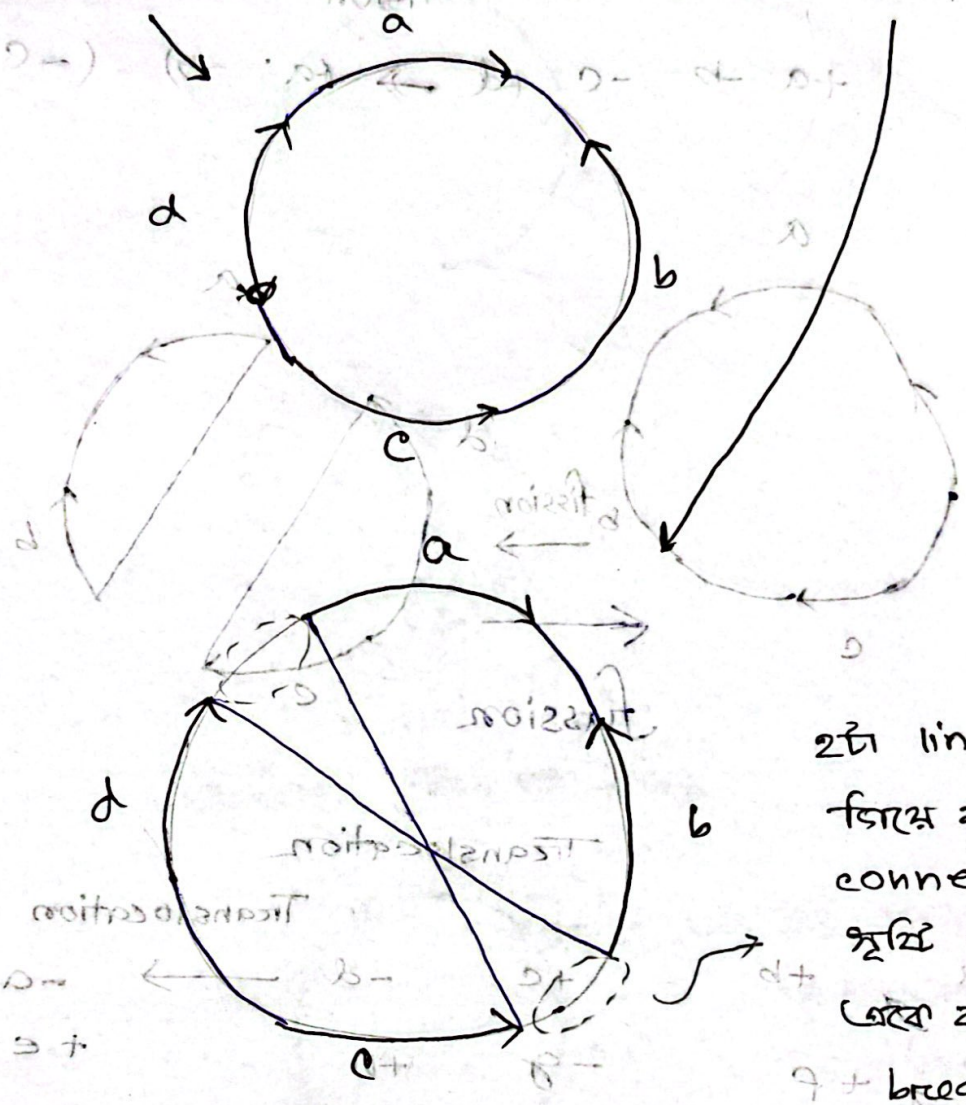
synteny block এ (+) থাকলে clockwise direction
(-) থাকলে anti

(+a -b -c +d) circular sequence হিসেবে consider



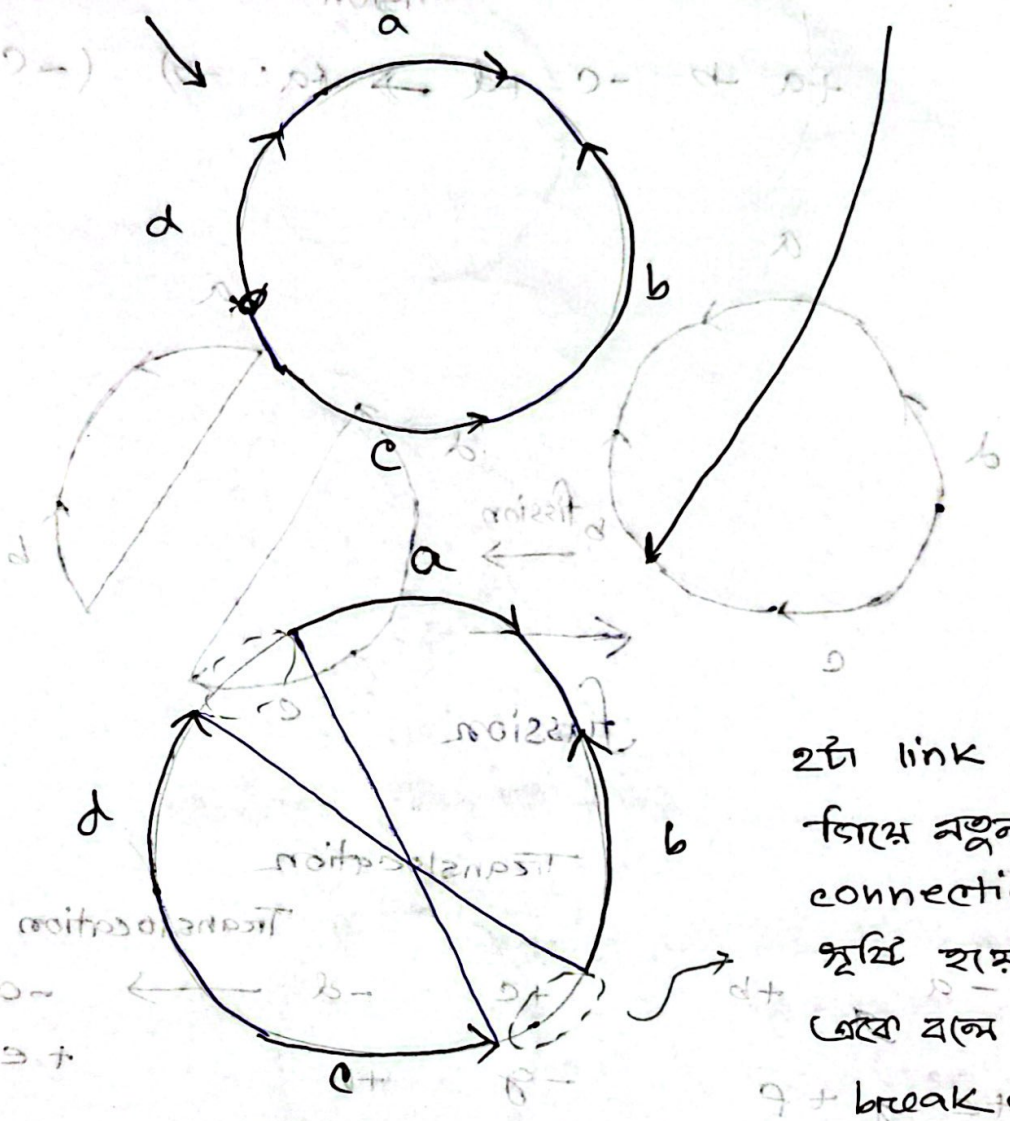


+a −b −c +d $\mathcal{D}(3,4)$ +a −b −d +c



2টা link ভেঙ্গে
দিয়ে নতুন 2টা
connection
সৃষ্টি হয়েছে।
এবে বলে 2
break operati

+a −b −c +d $\xrightarrow{\sigma(3,4)}$ +a −b −d +c

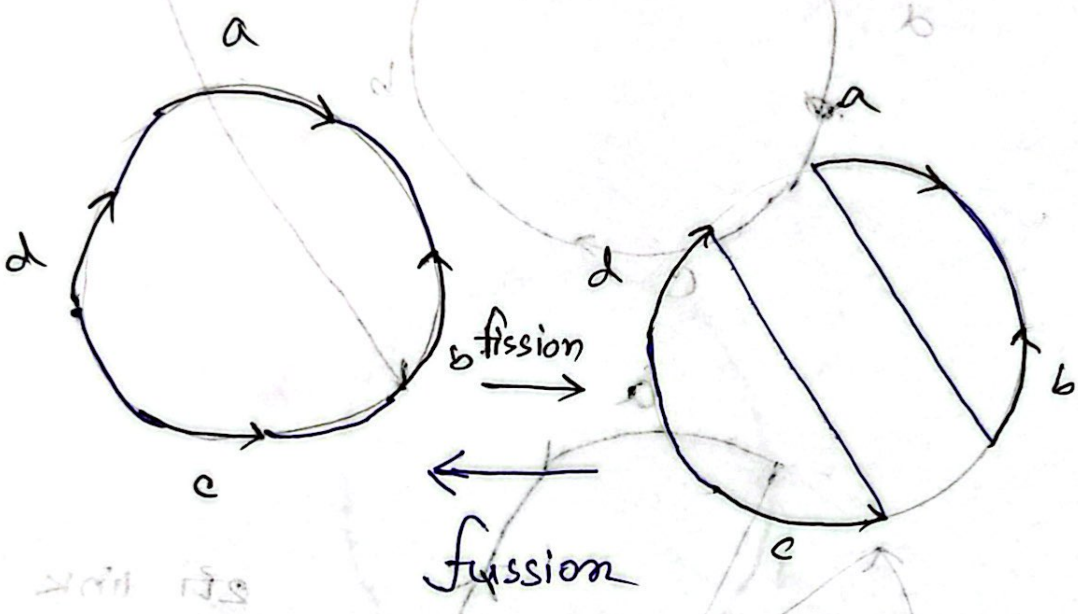


2টা link ভেঙ্গে দিয়ে নতুন 2টা connection সৃষ্টি হয়েছে। একে বলে 2 break operation

Fission

fision

+a −b −c +d → (+a +b) (−c +d)



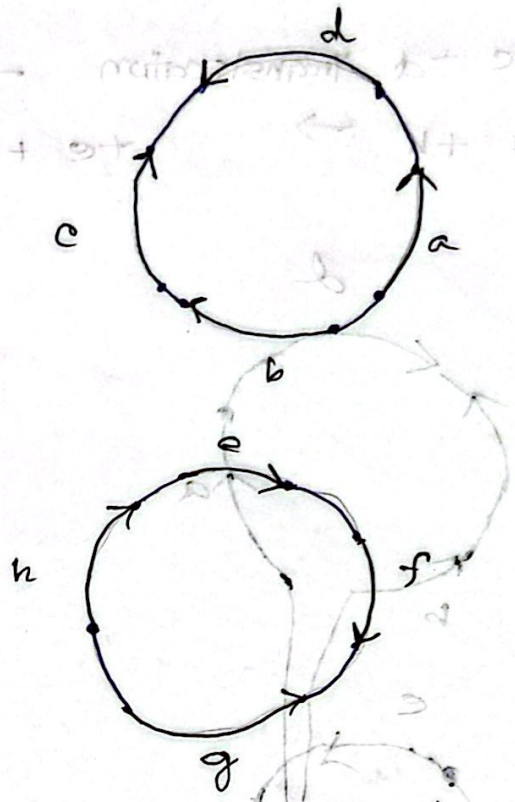
Translocation

−a +b +c −d →(Translocation) −a +f −g +h
+e +b +c −d

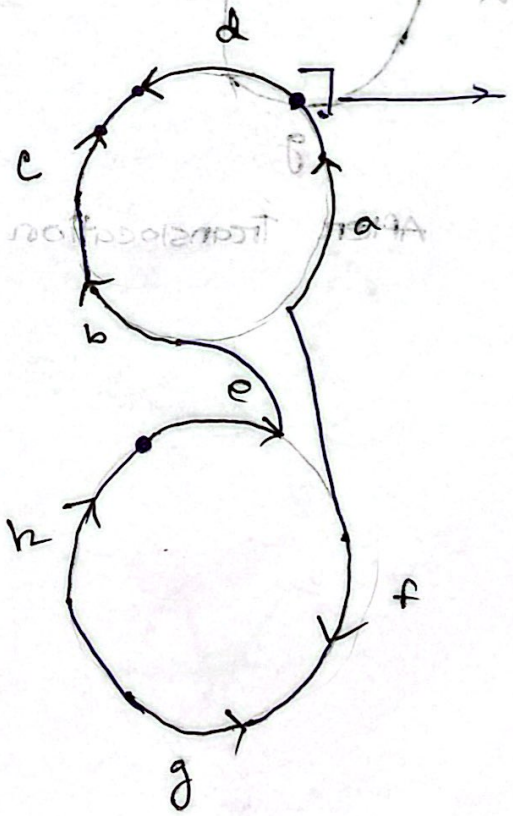
+e ↗ +f

−g +h

Translocation এ sequence ভেঙ্গে গিয়ে জোড়ায়
লাগে



Before Translocation



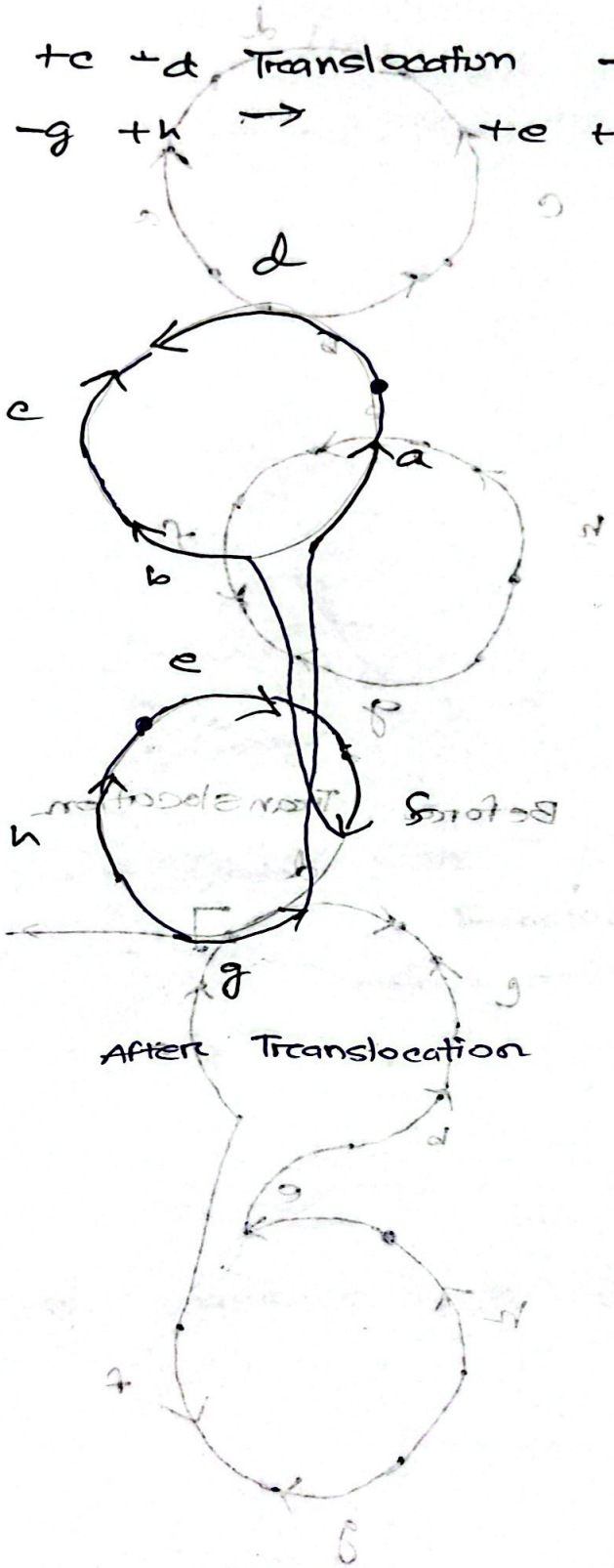
এই link খুলবে তাহবে না dot দিয়ে দিতে হবে সাবধানে

Dot খুলে দিতে হবে যেখান থেকে sequence শুরু হইছে তার আগে

After translocation.

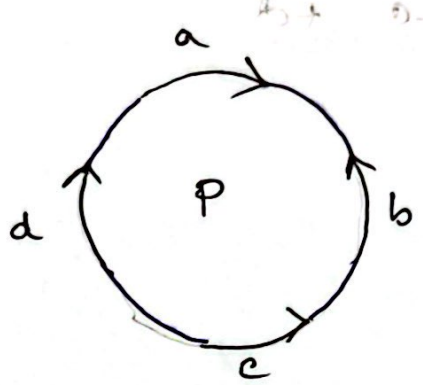
$-a+b+c+d$ Translocation $-a-g+h$

$+e+f-g+h \rightarrow +e+f+b+c-d$

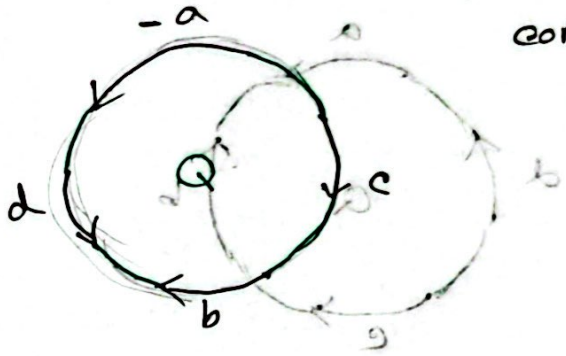


Breakpoint Graph: $P = +a\ -b\ -c\ +d$

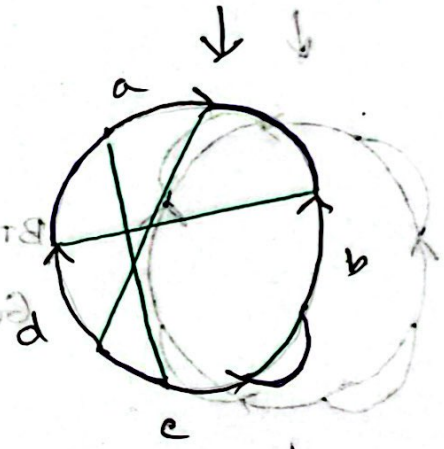
$Q = -a\ +c\ +b\ -d$



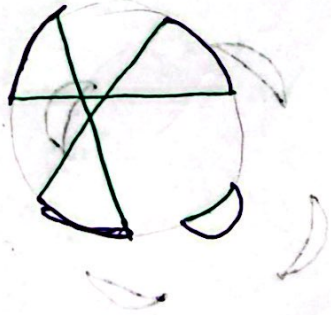
- Breakpoint এ এমনভাবে সাজাতে হবে যেন circular হয়।
- Arrow দিতে হবে P কে follow করে connection দিতে হবে 2টা কে follow করে।



Breakpoint Graph (P, Q)



~~Q~~ arrow follow না করে সামনা থেকে follow

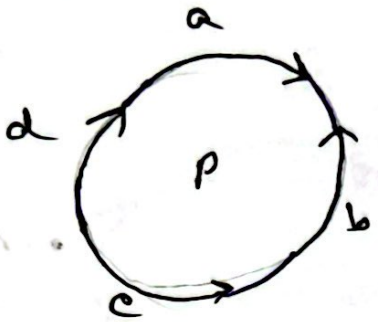


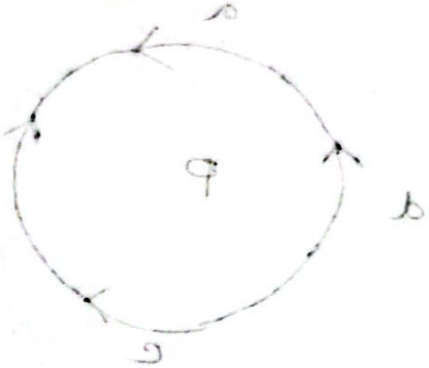
Cycle (P, Q) = 2

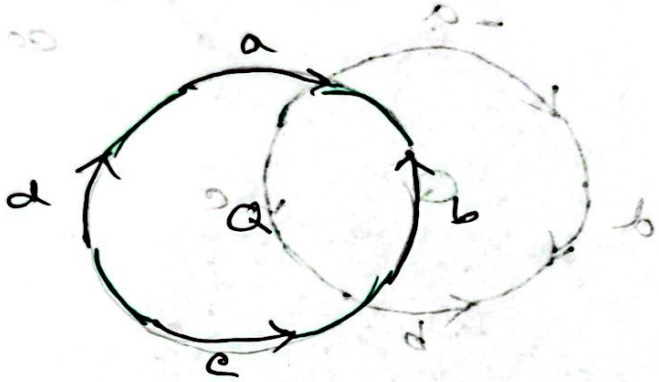
Breakpoint graph এ highest cycle থাকে যে কয়টা character থাকে ঐ কয়টা

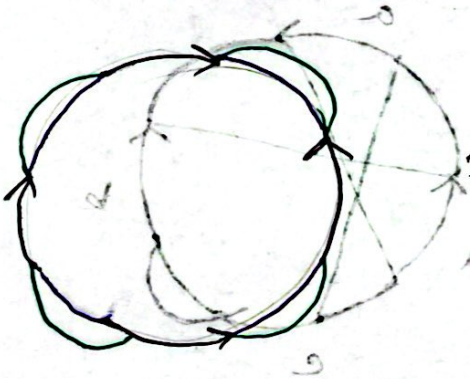
P = +a −b −c +d

Q = +a −b −c +d

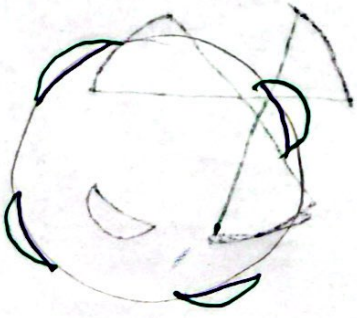








Breakpoint Graph



cycle (P, Q) = 4

2- break ~~point~~ distance (P, Q) = # of blocks - cycles (P, Q)

বাড়লে

2 টা link ~~কমলে~~ 1 টা বাড়ে 2 break distance

কমবে।