Science Setu Webinars by NIPGR (Twenty First)

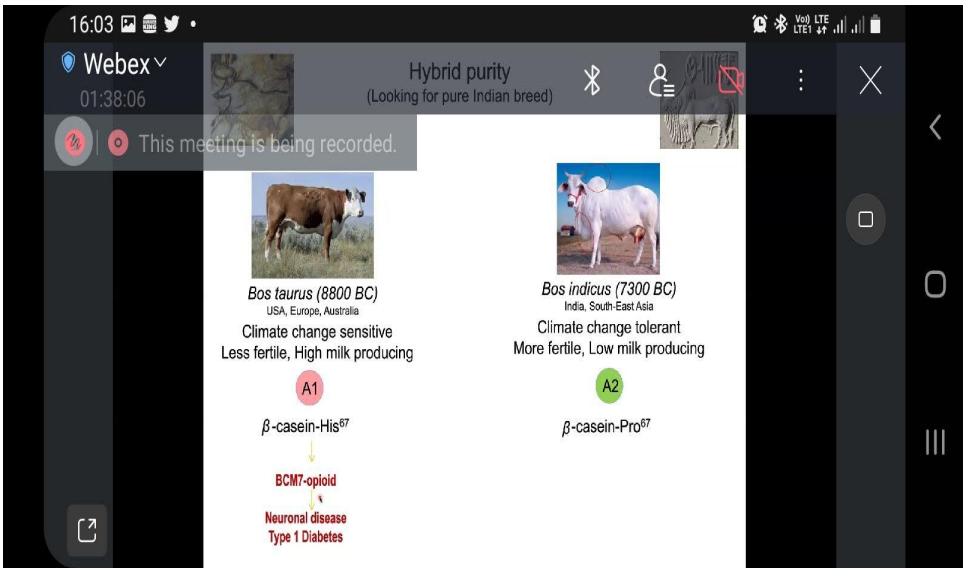
"Use of DNA sequencing in public life"

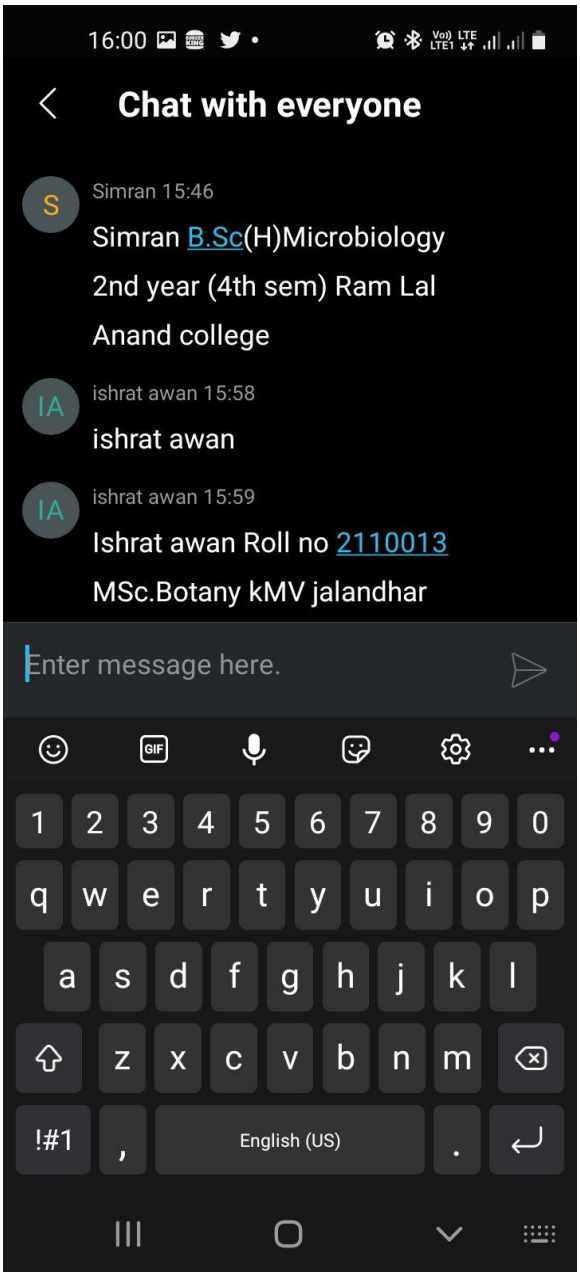
Date: 14th January, 2022

Resource person: Dr. Debasis Chattopadhyay, Scientist VII, NIPGR

The Department of Biotechnology, Government of India, has planned "Science Setu" as a virtual platform to connect research Institutes with undergraduate students. Under this, our college has been assigned to National Institute of Plant Genome Research (NIPGR), New Delhi. NIPGR is an autonomous institution aided by the Department of Biotechnology. Research at NIPGR focuses on functional, structural, evolutionary and applied genomics of plants, including crop plants. Through the Science Setu program, our students and faculty virtually connect with NIPGR, New Delhi and get to know about the multifarious kinds of plant based research. It is a unique opportunity for science students at undergraduate and postgraduate level to get an exposure to high-level research.

The resource person for twenty first science setu webinar was **Dr.Debasis Chattopadhyay,** Scientist VII, NIPGR. He explains the role of DNA sequencing in plant and animal life. DNA sequencing is a very accurate and effective technology to identify and track genetic differences between individuals and evolutionary events. With the technological advances and reduction of cost, DNA sequencing is being increasingly used in public life. New information is being discovered and new avenues are opening in the medical, agriculture and academic fields due to genomic insights. He discussed different next generation sequencing techniques and their uses, limitations and opportunities in various fields. The topic of the webinar was very interesting and would definitely help them in developing scientific mindset in students


16:03
Webex
01:38:06
This meeting is being recorded.
Hybrid purity
(Looking for pure Indian breed)
Bos taurus (8800 BC)
USA, Europe, Australia
Climate change sensitive
Less fertile, High milk producing
A1
β-casein-His67
BCM7-opioid
Neuronal disease
Type 1 Diabetes
Bos indicus (7300 BC)
India, South-East Asia
Climate change tolerant
More fertile, Low milk producing
A2
β-casein-Pro67


16:00
Chat with everyone
S
Simran 15:46
Simran B.Sc(H)Microbiology 2nd year (4th sem) Ram Lal Anand college
IA
ishrat awan 15:58
ishrat awan
IA
ishrat awan 15:59
Ishrat awan Roll no 2110013 MSc.Botany kMV jalandhar
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GIF
1 2 3 4 5 6 7 8 9 0
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a s d f g h j k l
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English (US)
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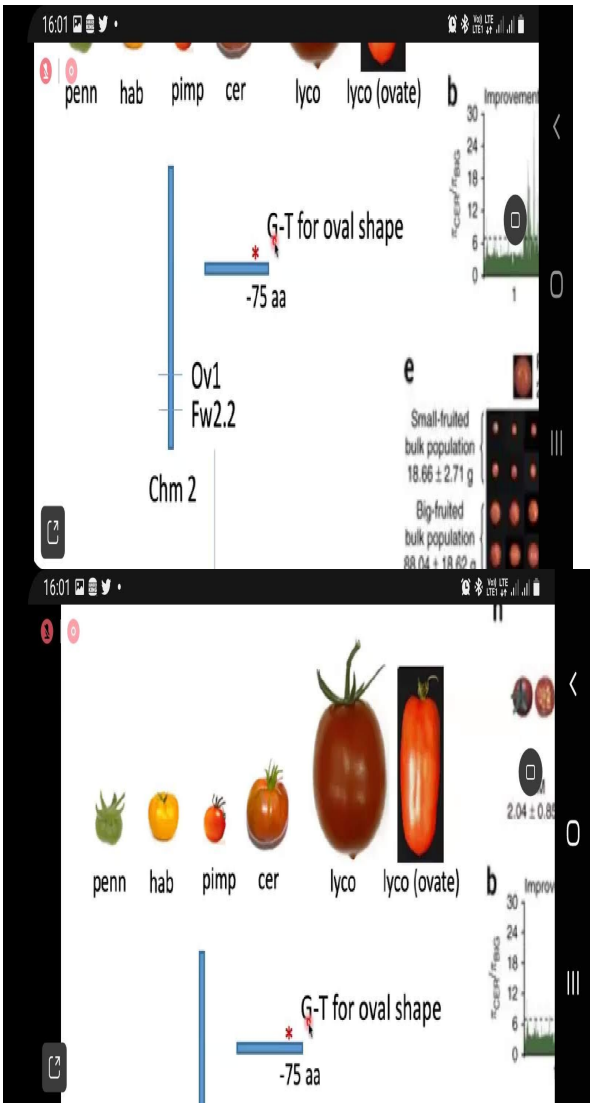
16:01
penn
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lyco (ovate)
b
Improvement
30
24
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1
G-T for oval shape
-75 aa
Ov1
Fw2.2
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Small-fruited
bulk population
18.66 ± 2.71 g
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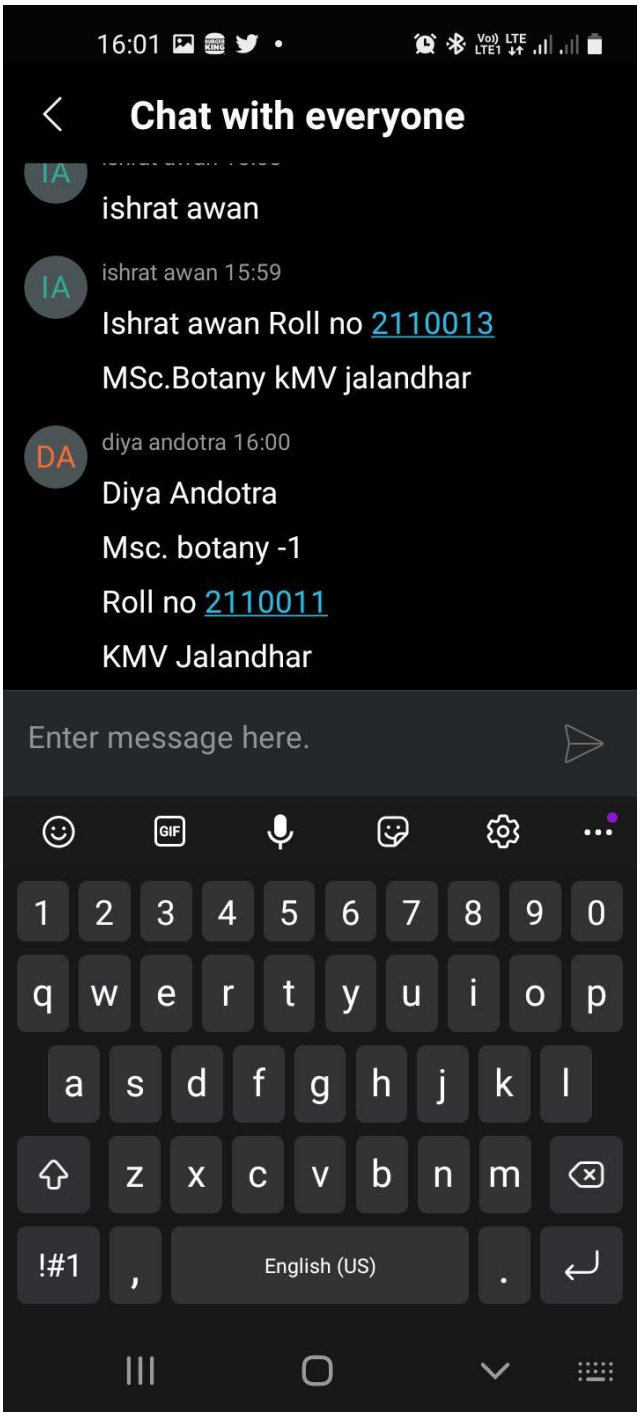
16:01
Chat with everyone
IA
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IA
ishrat awan 15:59
Ishrat awan Roll no 2110013
MSc.Botany kMV jalandhar
DA
diya andotra 16:00
Diya Andotra
Msc. botany -1
Roll no 2110011
KMV Jalandhar
Enter message here.
GIF
1 2 3 4 5 6 7 8 9 0
q w e r t y u i o p
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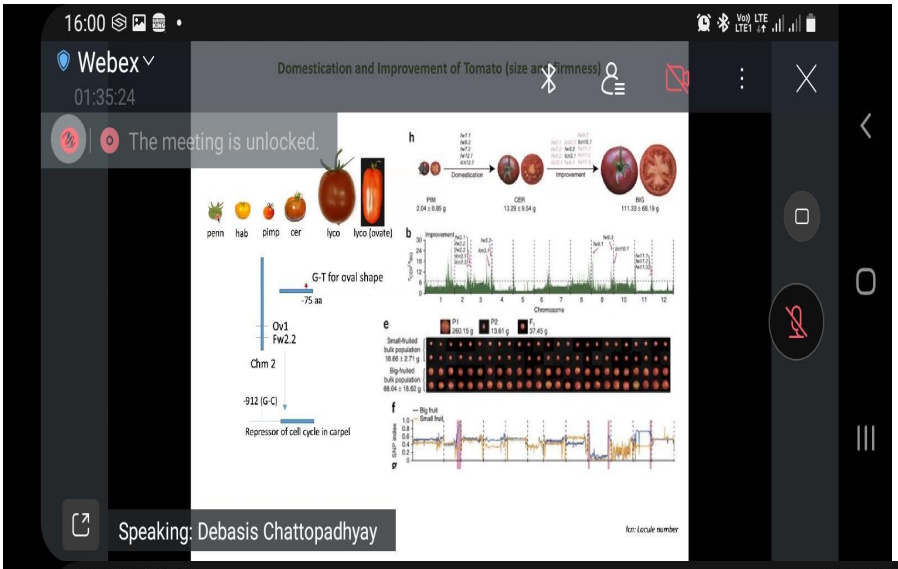
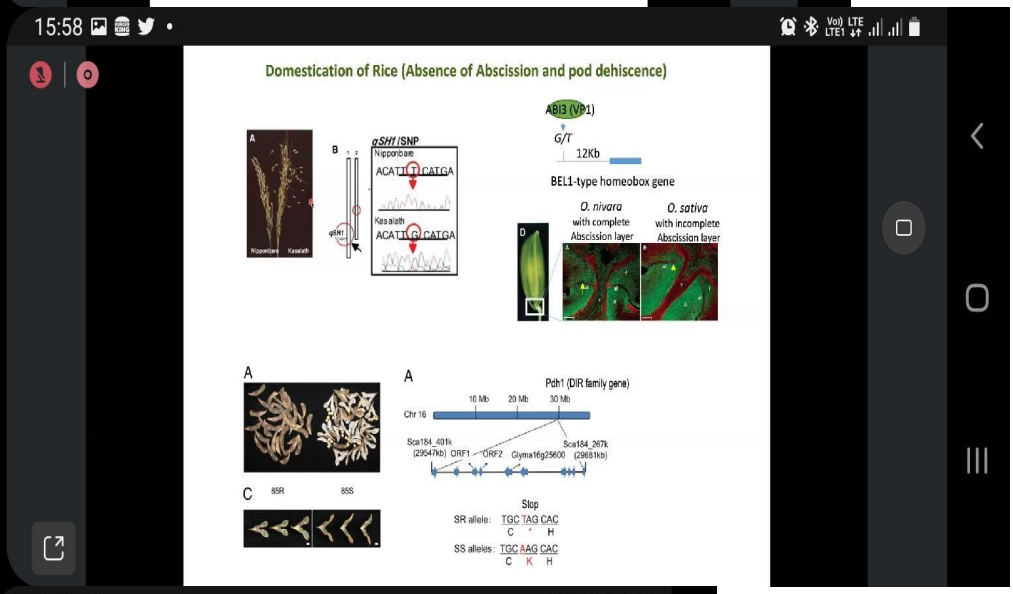
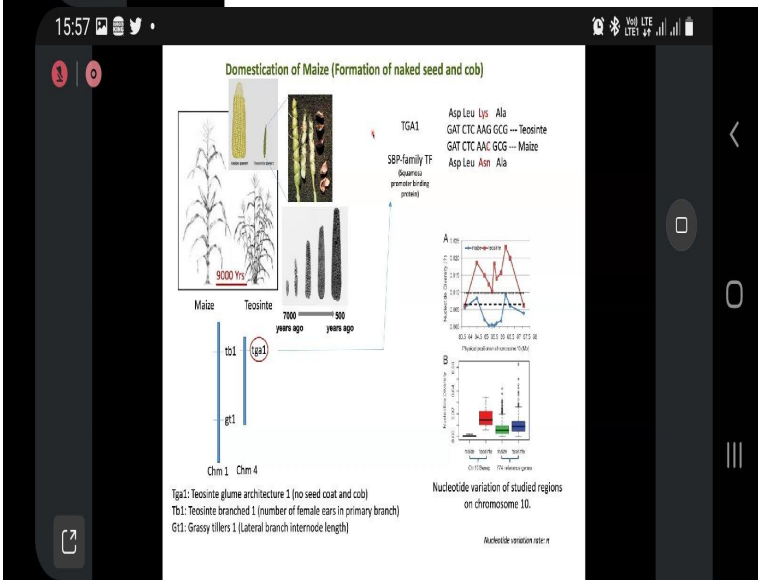

16:00
Webex
01:35:24
The meeting is unlocked.
Domestication and Improvement of Tomato (size and firmness)
penn hab pimp cer lyco lyco (ovate)
G-T for oval shape
~75 aa
Ov1
Fw2.2
Chm 2
~912 (G-C)
Repressor of cell cycle in carpel
Speaking: Debasis Chattopadhyay


15:58
Domestication of Rice (Absence of Abscission and pod dehiscence)
qSH1 /SNP
Nipponbare
ACATTTCATGA
Kasalath
ACATTGCATGA
ABI3 (VP1)
G/T
12Kb
BEL1-type homeobox gene
O. nivara
with complete
Abscission layer
O. sativa
with incomplete
Abscission layer
Pdh1 (DIR family gene)
Chr 16
10 Mb
20 Mb
30 Mb
Sca184_401k
(29547kb)
ORF1
ORF2
Glyma16g25600
Sca184_267k
(29681kb)
Stop
SR allele: TGC TAG CAC
C * H
SS alleles: TGC AAG CAC
C K H

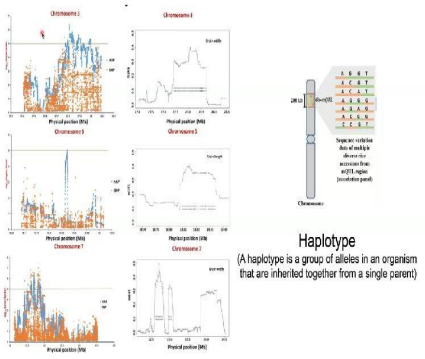

15:57
Domestication of Maize (Formation of naked seed and cob)
9000 Yrs
Maize
Teosinte
7000 years ago
500 years ago
tb1
tga1
gt1
Chm 1
Chm 4
TGA1
SBP-family TF
Asp Leu Lys Ala
GAT CTC AAG GCG -- Teosinte
GAT CTC AAC GCG -- Maize
Asp Leu Asn Ala
Tga1: Teosinte glume architecture 1 (no seed coat and cob)
Tb1: Teosinte branched 1 (number of female ears in primary branch)
Gt1: Grassy tillers 1 (Lateral branch internode length)
Nucleotide variation of studied regions
on chromosome 10.

15:56

Debasis Chattopadhya... is sharing

Genome wide association study (GWAS)

Association panel → Phenotyping → Resequence → Association of Phenotype /Genotype data → Association mapping



Haplotype

(A haplotype is a group of alleles in an organism that are inherited together from a single parent)

15:52

Webex

01:27:10

Debasis Chattopadhya... is sharing

HLA Typing

Human leucocyte antigen (HLA) genes are located 3.6 Mb region of chromosome 6p21. They are highly polymorphic and decide transplant (bone marrow) acceptance/rejection, autoimmune disease. HLA genotyping are now routinely done before bone-marrow transplant for transplant-matching.

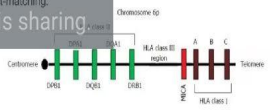


Figure 1. The HLA region in Chromosome 6.

15:51

HLA Typing

Human leucocyte antigen (HLA) genes are located 3.6 Mb region of chromosome 6p21. They are highly polymorphic and decide transplant (bone marrow) acceptance/rejection, autoimmune disease. HLA genotyping are now routinely done before bone-marrow transplant for transplant-matching.

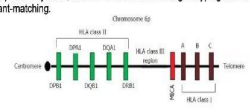
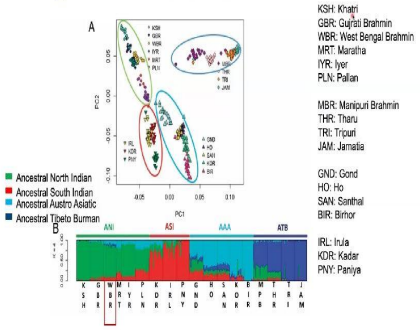


Figure 1. The HLA region in Chromosome 6.

History of Human migration

Genomic reconstruction of the history of extant populations of India reveals five distinct ancestral components and a complex structure

Analabha Basu[A,1], Neeta Sarkar-Roy[A], and Partha P. Majumder[A,B,1]



KSH: Khatri
GBR: Gujrati Brahmin
WBR: West Bengal Brahmin
MRT: Maratha
IYR: Iyer
PLN: Pallan

MBR: Manipuri Brahmin
THR: Tharu
TRI: Tripuri
JAM: Jamatia

GND: Gond
HO: Ho
SAN: Santhal
BIR: Birhor

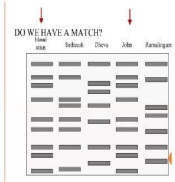
IRL: Irula
KDR: Kadar
PNY: Paniya

Fingerprinting vs. Sequence-based Genotyping

I like the rainy season most
1 4 3 5 6 4

Fingerprinting

1. Number of words
2. Approx. Size of the words (no. of letters)



Cheap and quick

I lkie teh myai ssones mttt.
1 4 3 5 6 4

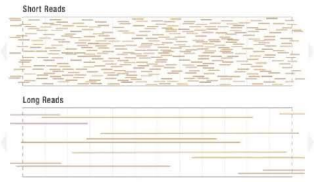
Sequence-based genotyping

1. Number of words
2. Actual size of the words (no. of letters)
3. Letters
4. Sequence of the letters
5. Any change in letters and/or sequence

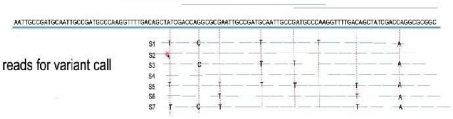
Important for crops produced by recurrent backcrosses where variation is less

Expensive and time-taking

DNA assembly and SNP calling



Long reads for assembly



Short reads for variant call

'सशक्त भारत'
विज्ञान से विकास-
प्रौद्योगिकी से प्रगति

आज़ादी का अमृत महोत्सव

आत्मनिर्भर भारत
जन-भागीदारी

Science Setu Webinars

Twenty first webinar
on **14th January, 2021, Friday**
at **3:00 p.m.**

"Use of DNA sequencing in public life"

by
Dr. Debasis Chattopadhyay
Scientist VII, NIPGR

Moderated by
Dr. Pinky Agarwal and Dr. Amarjeet Singh
Scientists, NIPGR

Link for the webinar:
https://nipgr.webex.com/nipgr/j.php?MTID=mcfbe780b584d9588b2798570b6c06bad