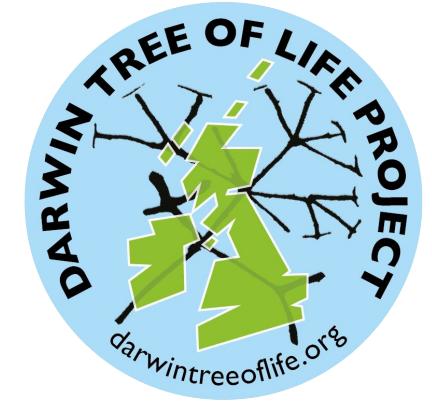




Apple Day

Max Brown
(and a great many other folk)



wellcome
sanger
institute

What is Apple Day?

- Celebration of all things apple



WELSH MARCHES POMONA



WRITTEN BY MICHAEL PORTER & ILLUSTRATED BY MARGARET GILL

What is Apple Day?

curiosity club

Tree of Life

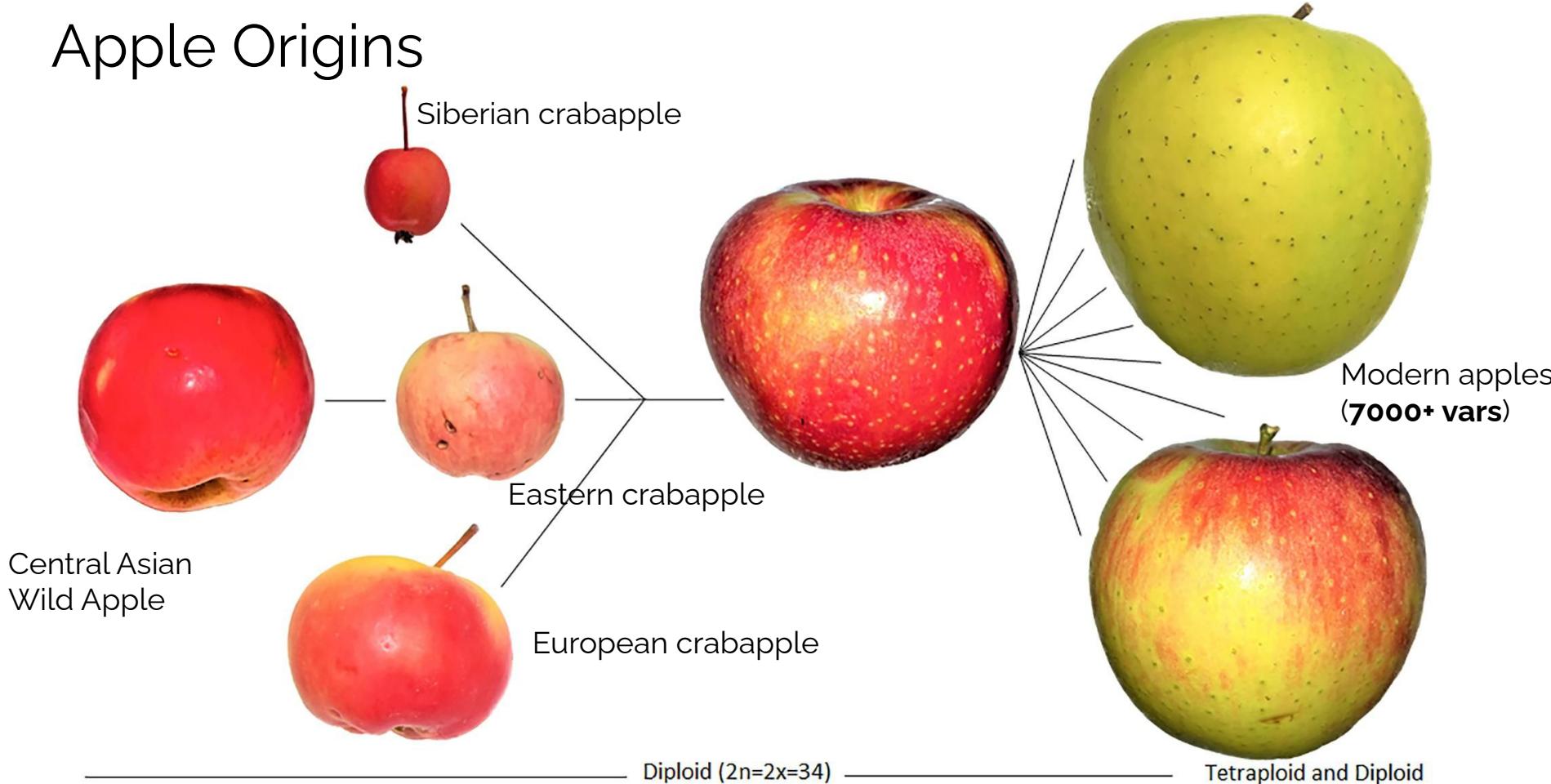


What are Apples?

- 25 - 47 species
- All domestic apples belong to a single species



Apple Origins





Royal
Botanic Garden
Edinburgh

What did we do?





Royal
Botanic Garden
Edinburgh

Collection collaboration



Royal
Botanic Garden
Edinburgh



Royal
Botanic
Gardens Kew



What did we sequence?

Alderman, Ashmead's Kernel, Bardsey Island Apple, Beauty of Moray, Blenheim Orange, Bloody Ploughman, Bramleys Seedling, Breakwells Seedling, Brown Snout, Costard, Cox's Orange Pippin, Cutler Grieve, Decio, Discovery, Early Julian, East Lothian Pippin, Egremont Russet Ellison's Orange, Fiesta Harvey, Hawthornden Hoods Supreme, Irish Peach James Grieve, Killerton Sweet Kingston Black, Lass o Gowrie, Laxton's Superb, Lord Burghley Malus John Downie, Coxs self, Flower of Kent, Newton Wonder, Oslin Park Farm Pippin, Pixie, Port Allen Russet, Red Bountiful, Red Devil, Red Falstaff, Red Windsor, Robusta 5, Sangers Newton, Scotch Bridget, Scotch Dumpling, Scrumptious, Stirling Castle, Stobo Castle, Tower of Glamis, Trinity's Newton, Worcester Pearmain

What did we sequence?

Alderman, Ashmead's Kernel, Bardsey Island Apple, Beauty of Moray, Blenheim Orange, Bramley's Seedling, Cox's Orange Pippin, Cutler Grieve, Decio, Discovery, Early Julyan, East Lothian Pippin, Egremont Russet, Ellison's Orange, Fiesta Harvey, Hawthonden Hoods Supreme, Irish Peach James Grieve, Killerton Sweet King, Laxton's Superb, Lord Burghley, Malus John Downie, Roxburgh, Royal Gala, St. Edmund's Russet, Winter Wonder, Oslin Park Farm Pippin, Pixie, Port Allen Russet, Red Bountiful, Red Devil, Red Falstaff, Red Windsor, Robusta 5, Sangers Newton, Scotch Bridget, Scotch Dumpling, Scrumptious, Stirling Castle, Stobo Castle, Tower of Glamis, Trinity's Newton, Worcester Pearmain

Previous Apple assembly

High-quality *de novo* assembly of the apple genome and methylome dynamics of early fruit development

[Nicolas Daccord](#), [Jean-Marc Celton](#), [Gareth Linsmith](#), [Claude Becker](#), [Nathalie Choisne](#), [Elio Schijlen](#),
[Henri van de Geest](#), [Luca Bianco](#), [Diego Micheletti](#), [Riccardo Velasco](#), [Erica Adele Di Pierro](#), [Jérôme Gouzy](#), [D Jasper G Rees](#), [Philippe Guérif](#), [Hélène Muranty](#), [Charles-Eric Durel](#), [François Laurens](#), [Yves Lespinasse](#), [Sylvain Gaillard](#), [Sébastien Aubourg](#), [Hadi Quesneville](#), [Detlef Weigel](#), [Eric van de Weg](#),
[Michela Troggio](#) & [Etienne Bucher](#) 

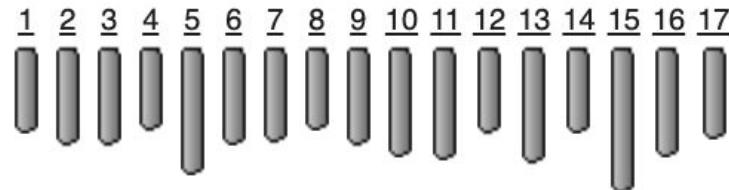
[Nature Genetics](#) **49**, 1099–1106 (2017) | [Cite this article](#)

37k Accesses | **322** Citations | **156** Altmetric | [Metrics](#)

- Current reference double haploid, large team of people, genetic map...
- 'Golden Delicious'

DToL assembly quality is astonishing

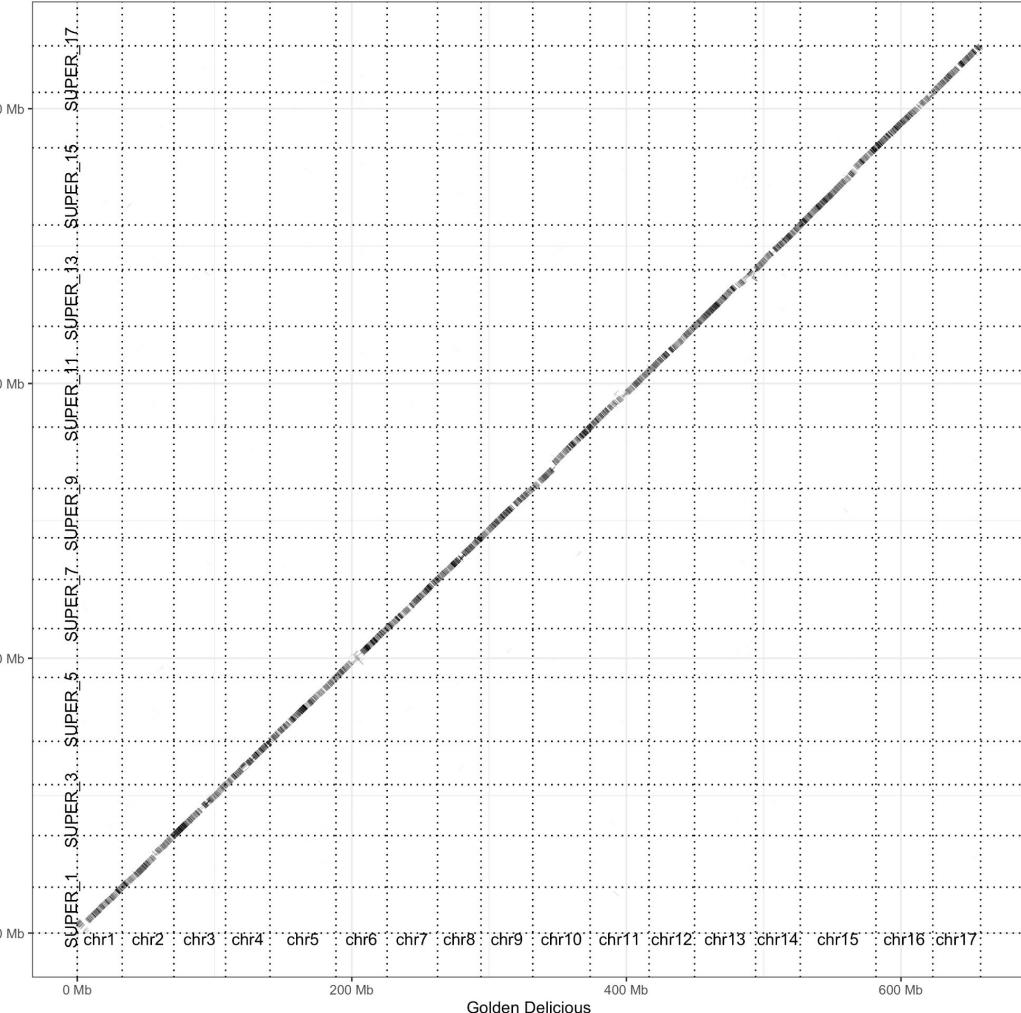
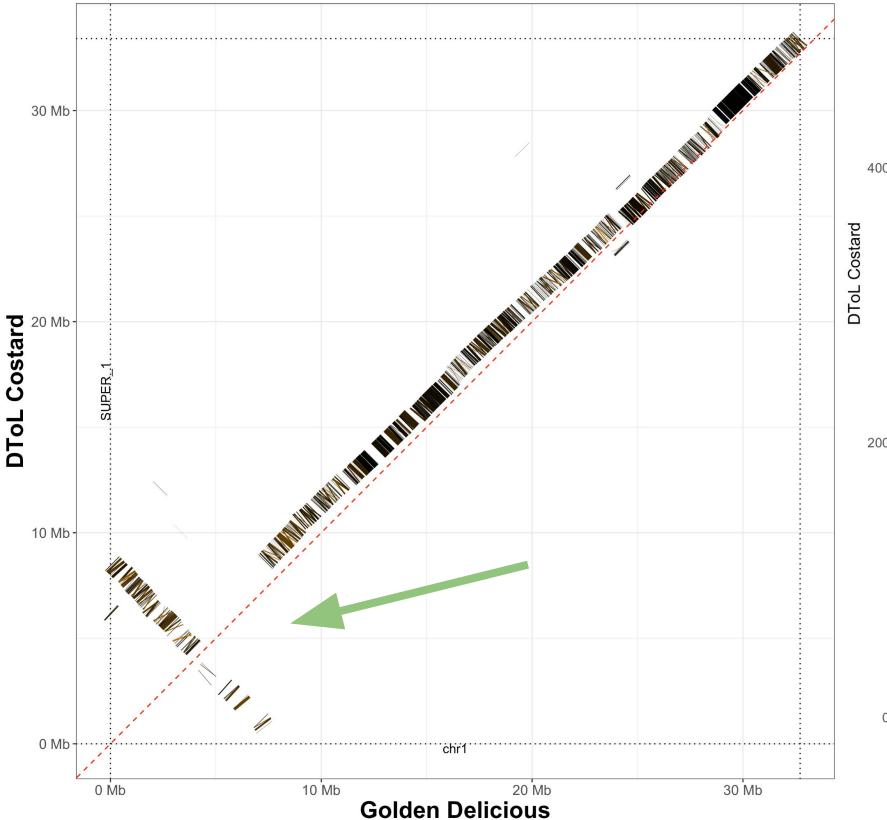
- Chromosomal (640-650Mb)



- N50 36 - 37 Mb

- High BUSCO completeness (> 98%)

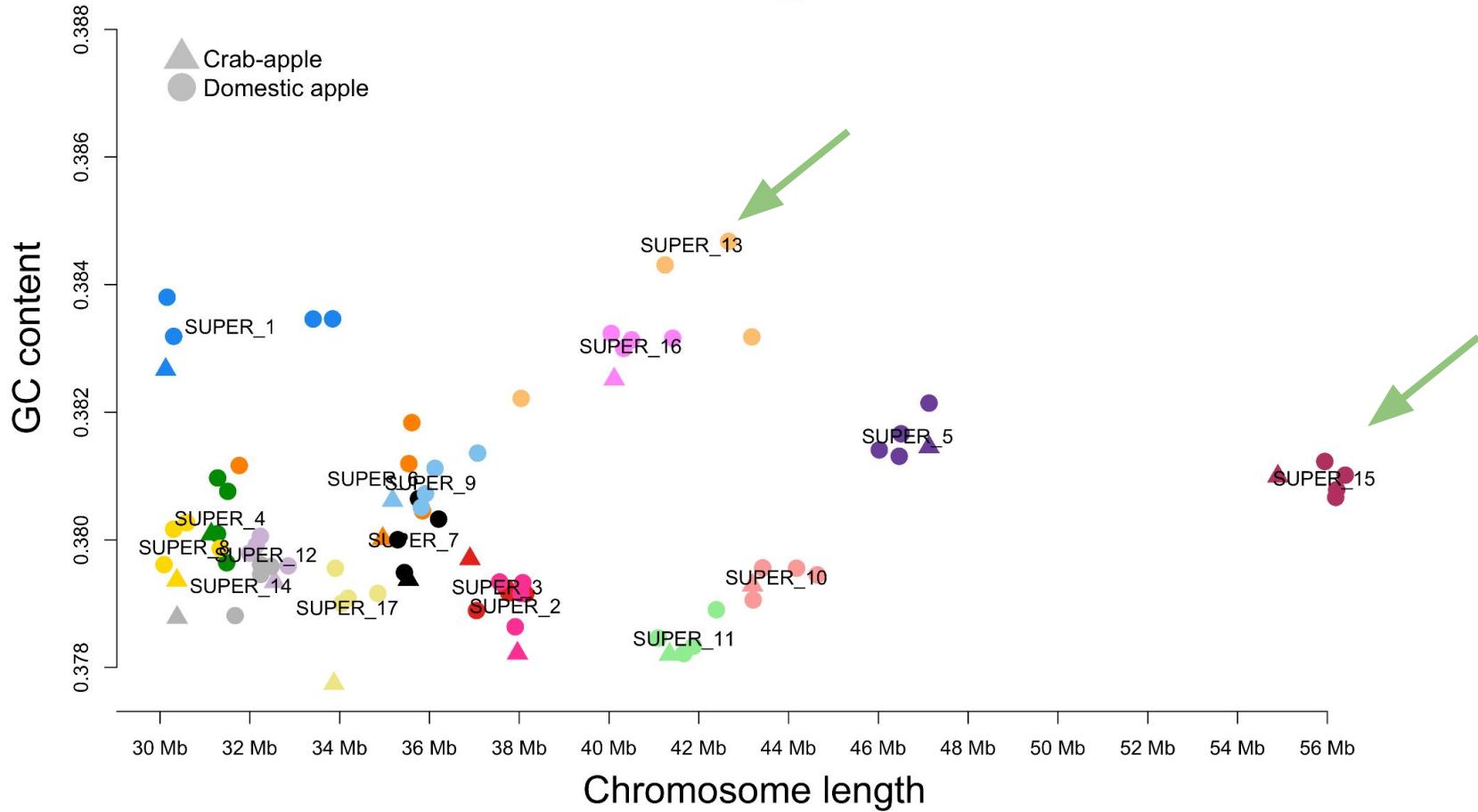
Assembly comparison



What are we looking to do?

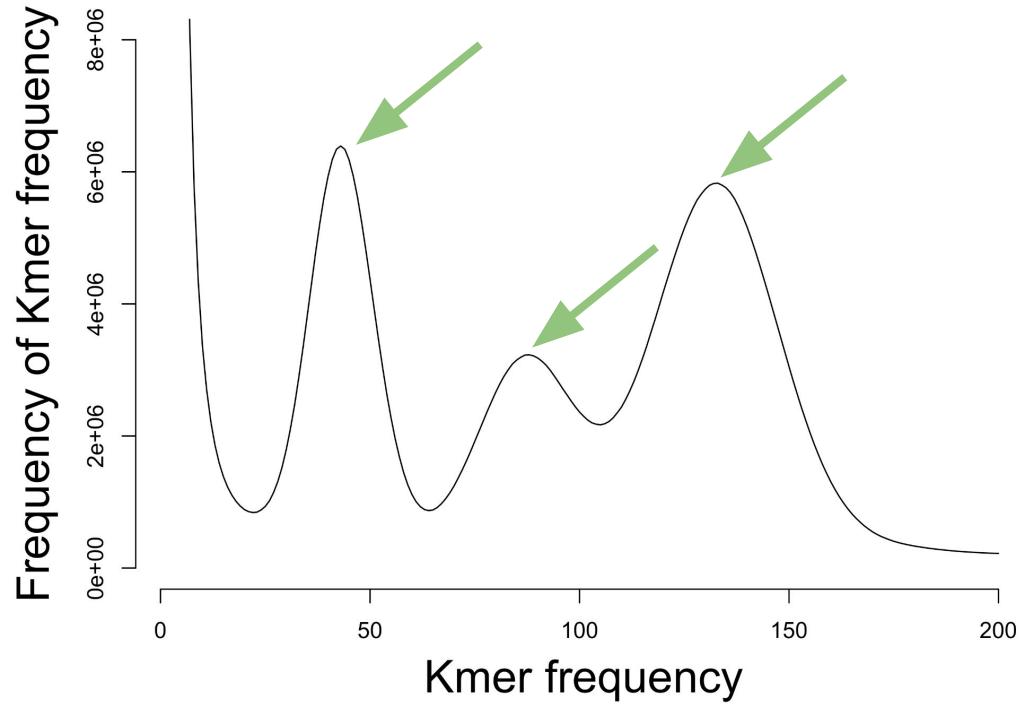
- Investigate genome structure within/between cultivars
- Variability between cultivars - does this variation correlate with apple characteristics?
- Investigate Newton's Apple tree - how different are the clones? What kind of triploid is it?

All the Apple chromosomes!



Newton's Apple (aka 'Flower of Kent')

- What is happening between the copies of the genome?



Many thanks

- Mark Blaxter
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- Sam Brockington
- Jack Monaghan
- Caroline Howard
- Shane McCarthy
- Alan Tracey
- Max Coleman
- Alex Twyford
- Jennifer Johns
- Ilia Leitch
- Tom Hooijenga
- Nancy Holyroyd
- Ian Still
- Maja Todorovic
- GRIT & ToLA teams!



Royal
Botanic Garden
Edinburgh



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COLLEGE
CAMBRIDGE

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Gardens



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