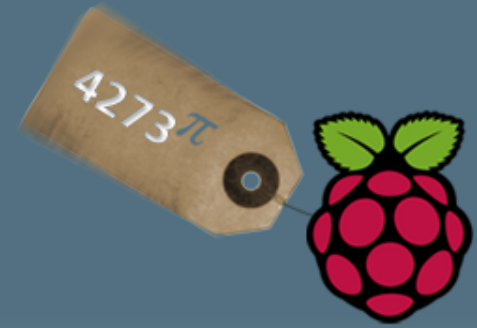




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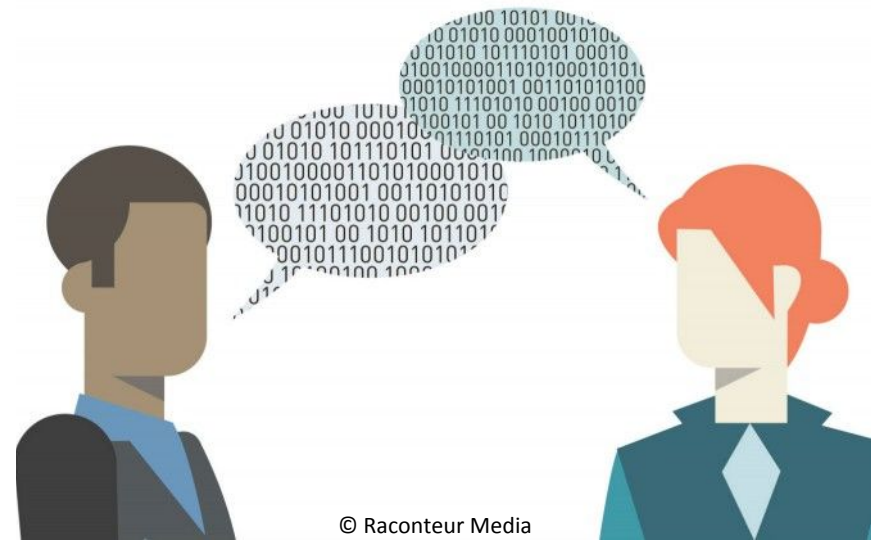


Doing bioinformatics on the Raspberry Pi

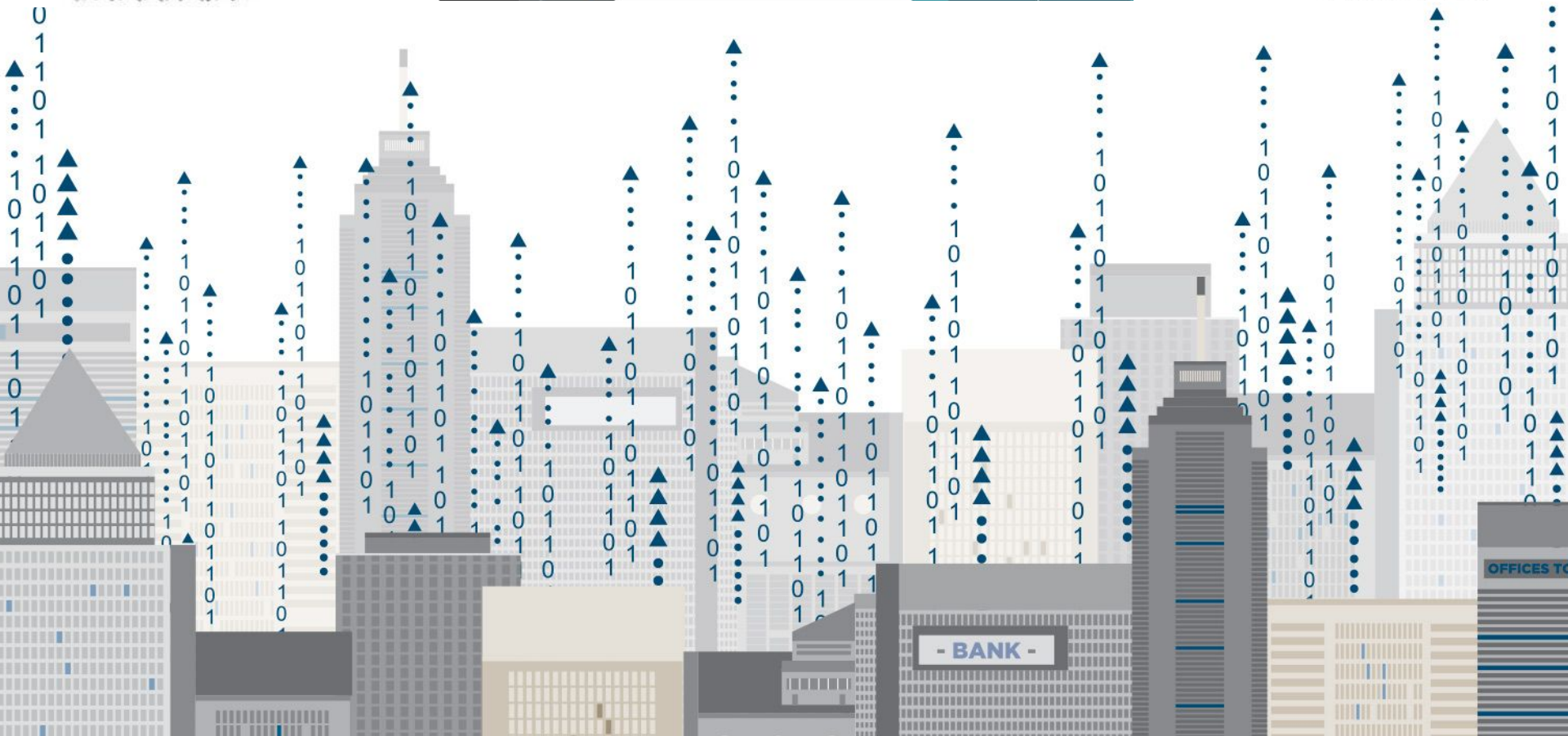
Heleen Plaisier
Daniel Barker

@4273pi

<http://4273pi.org>

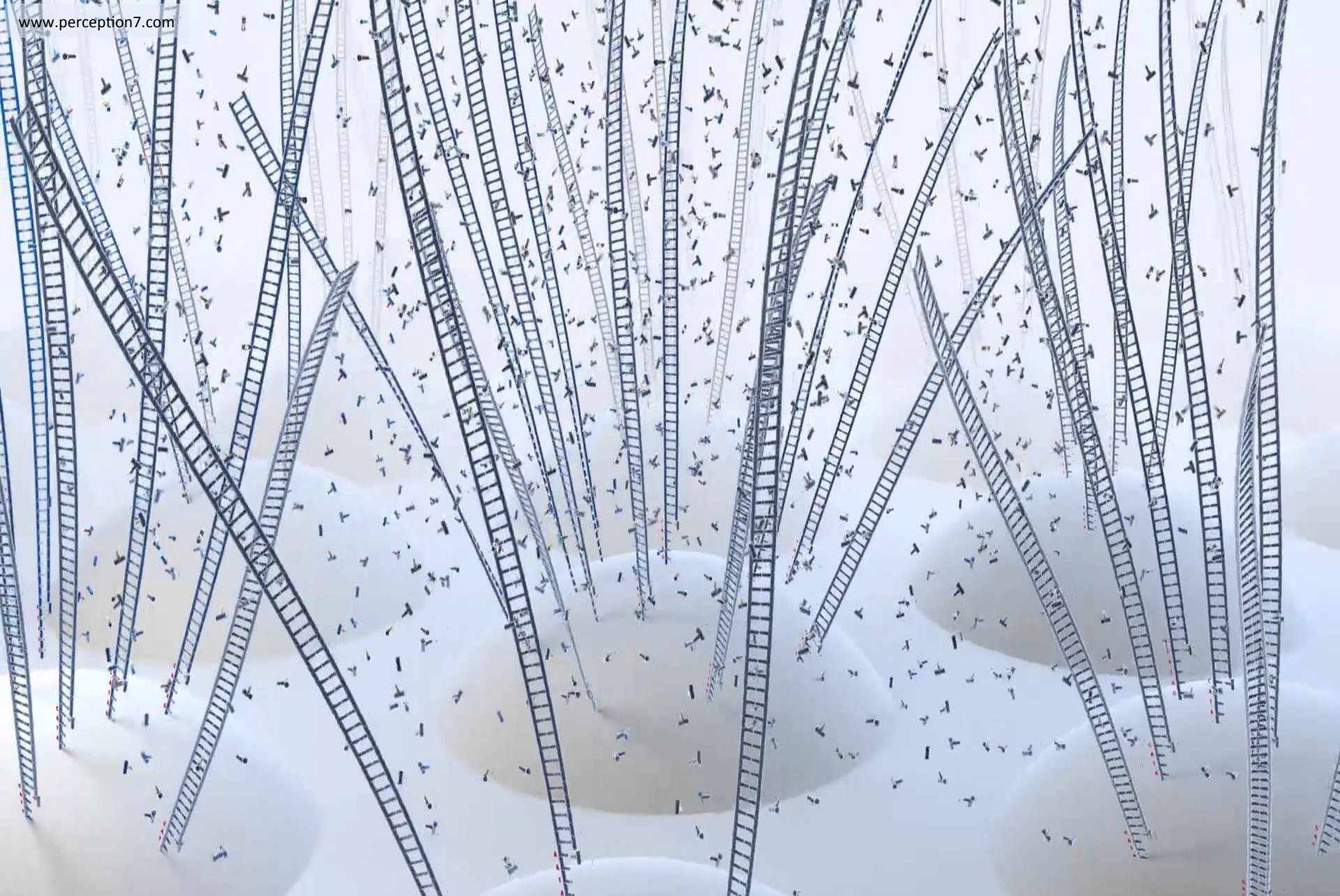


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bioinformatics helps biologists find needles within genomic haystacks

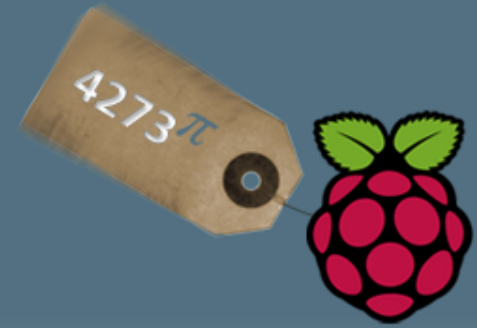




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University of
St Andrews

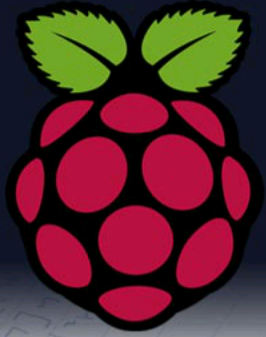


4273π

Freely available materials for
teaching and learning
bioinformatics on the Raspberry Pi



4273π in practice



```
pi@raspberrypi: ~/4273pi/week6
File Edit Tabs Help
pi@raspberrypi ~/4273pi/week6 $ snap fly dsec_genomic_dna.fa
scoring....decoding.10.20.30.40.50.60.70.80.90.100 done
scoring....decoding.10.20.30.40.50.60.70.80.90.100 done
>scaffold_22:781484,783483
Einit 210 519 + 20,805 0 1 2 scaffold_22:781484,783483-snap.1
Eterm 570 760 + 11,609 2 0 1 scaffold_22:781484,783483-snap.1
Einit 827 1417 + 37,346 0 0 1 scaffold_22:781484,783483-snap.2
Eterm 1577 1627 + 16,449 0 0 1 scaffold_22:781484,783483-snap.2
pi@raspberrypi ~/4273pi/week6 $
```



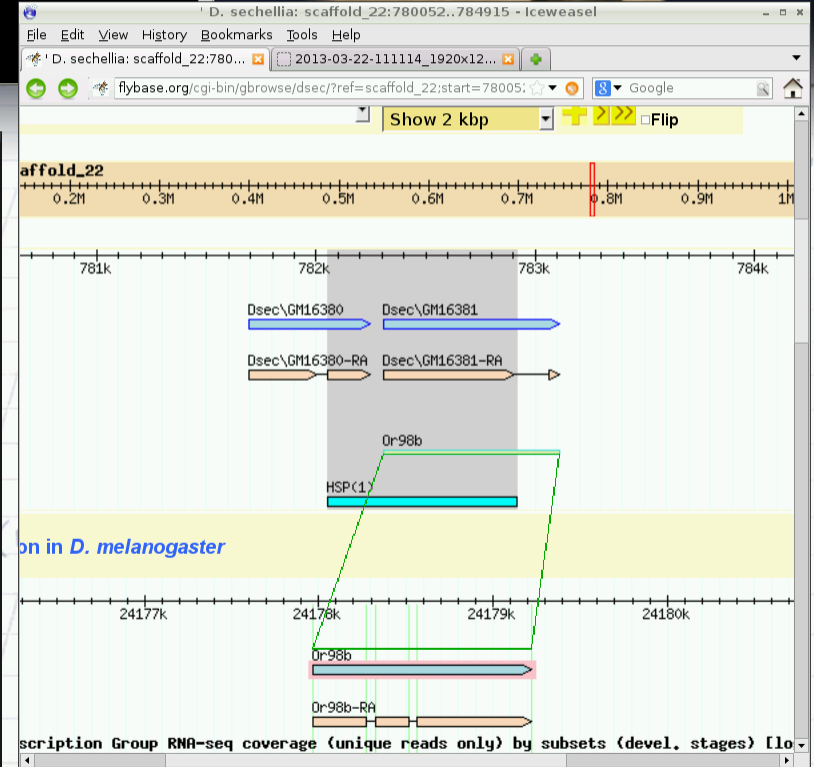
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GeneWise - Alignment - Iceweasel
File Edit View History Bookmarks Tools Help
GeneWise - Alignment
www.ebi.ac.uk/tools/services/web_genewise/toolresult.ebi?tool=genewise
scaffold_22:781 537 agtcgacgacggcctcctcgccgctcgcctagatctccagatcagcct
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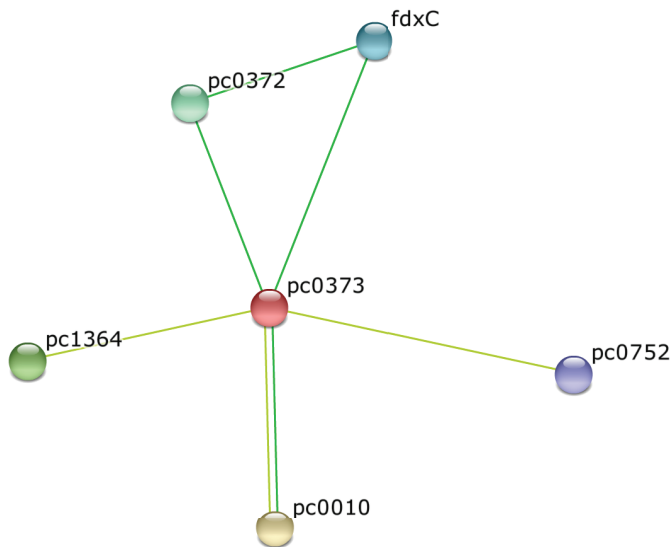
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CVLQR E:E[gaa] THCAVAEMIVTRES
scaffold_22:781 504 tgtcagGTAAGCT Intron 1 TAGAAactggggaagaaga
gtag <1-----[520 : 569]-1> cagctcatttcgag
ttgag tcctctagaccgat

Dmel_Or98b 119 RRDQFISAMYAYCFITAGLSACLMSPLSMLISYQRTGELQPKFFPP
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tgtgctctgtcctctgtctgctggcgcgccc aataggcctctc

Dmel_Or98b 165 VYPWDMNKLNSNYIISYFWN
NM LSNYIISYFWN
-----NMNLSNYIISYFWN
scaffold_22:781 752 AGTGTGTA S:N[aac] GAGAC aaactaattt
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tgcccccctctcgt

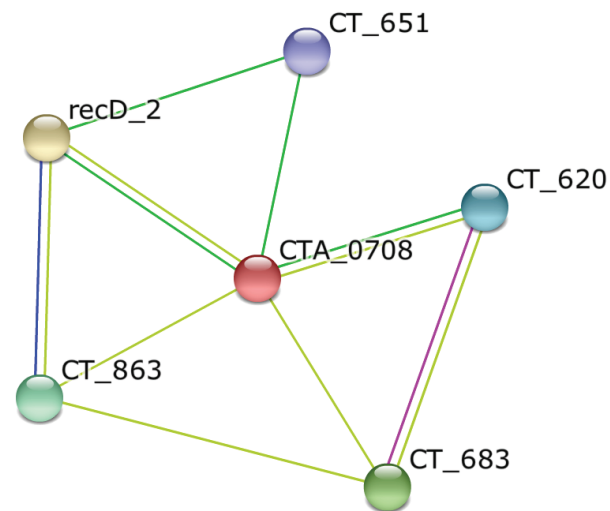
Dmel_Or98b 185 VCAALGVALPTVCVDTLFCSLSHNLALFQIARHKMMHFEGRNKETH
VC ALGVALPTVC+DTLFCSLSHNLALFQIARHKMMHFEGRNKET E
```





Predicted Functional Partners:

Node	Description	Neighborhood	Textmining	Score
pc0010	putative exodeoxyribonuclease V alpha chain RecD (622 aa)	●	●	0.754
pc1364	two-component response regulator (441 aa)	●	●	0.667
pc0372	hypothetical protein (183 aa)	●	●	0.510
fdxC	putative ferredoxin [2Fe-2S] IV (91 aa)	●	●	0.486
pc0752	GTP-dependent nucleic acid-binding protein EngD (365 aa)	●	●	0.447



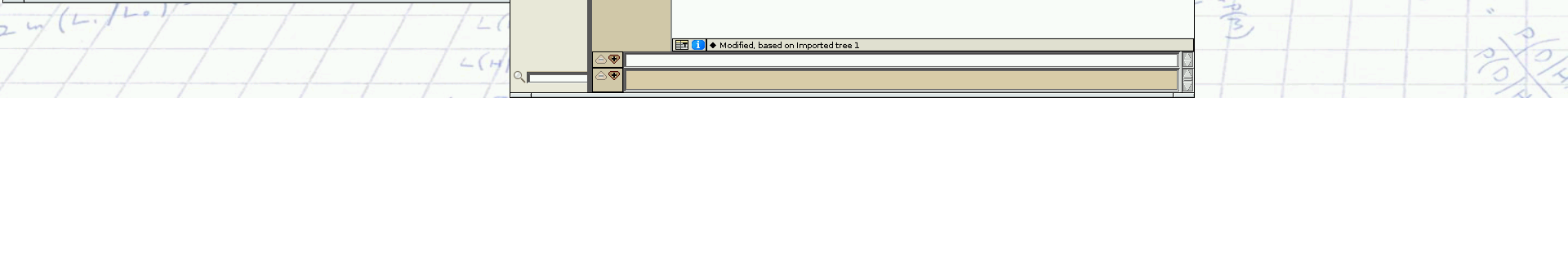
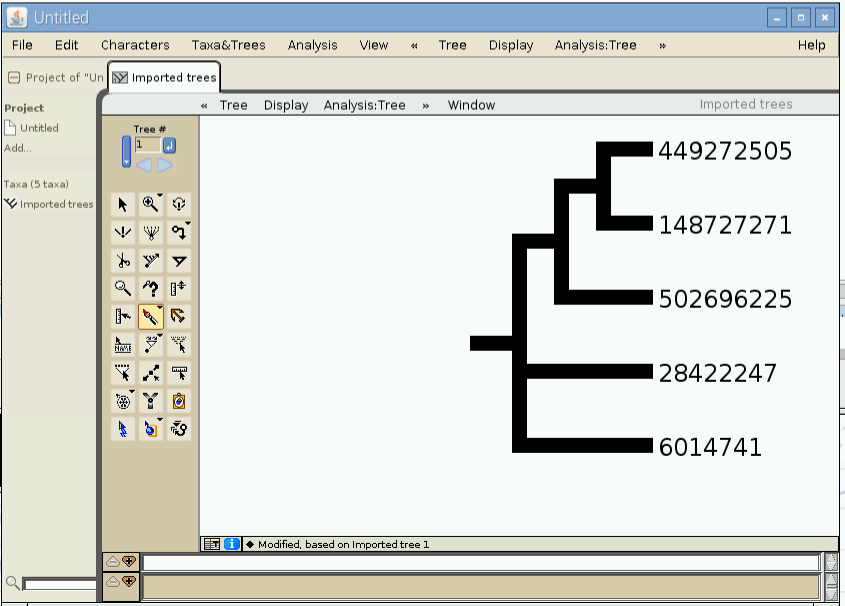
Predicted Functional Partners:

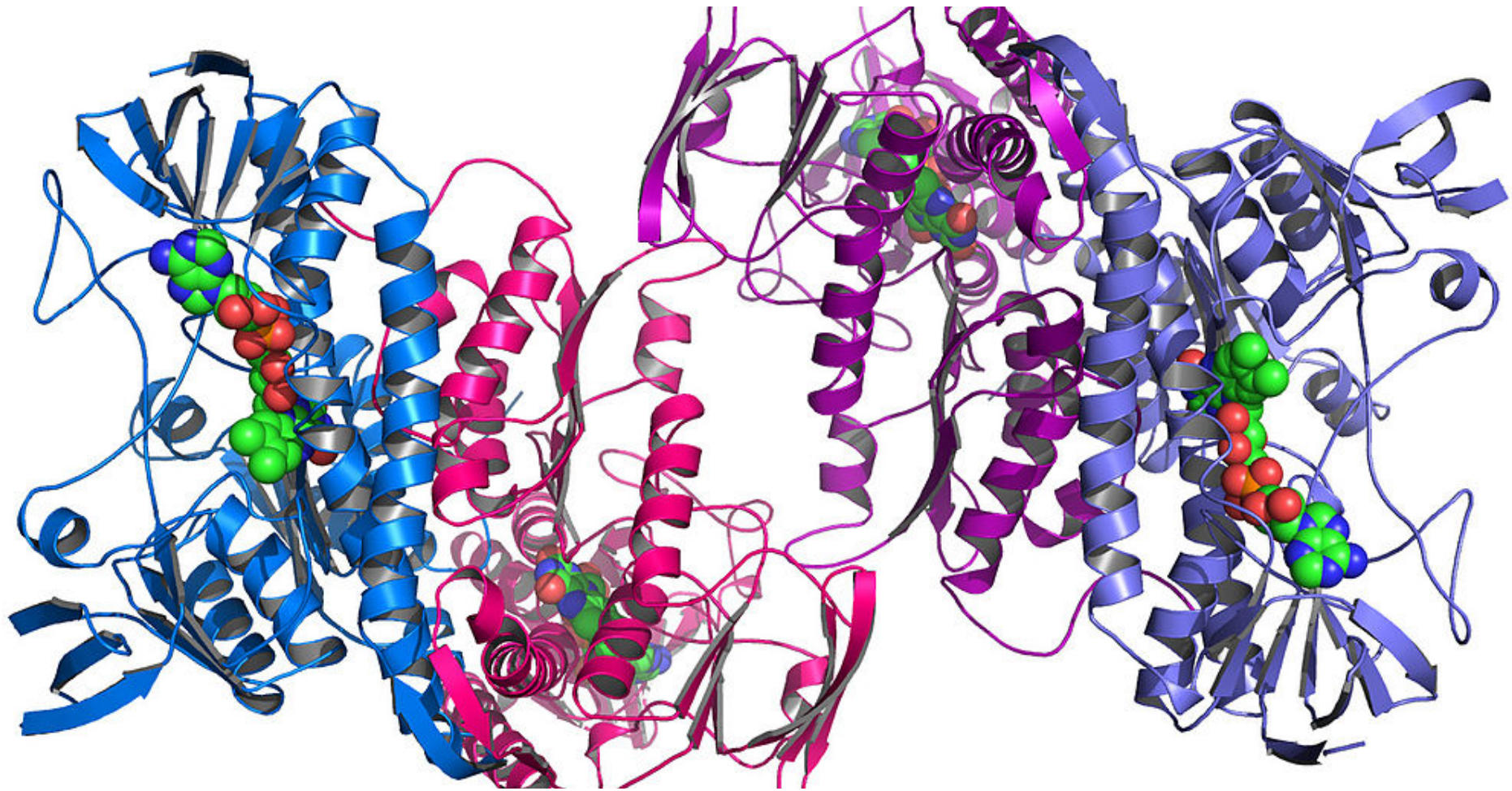
Node	Description	Neighborhood	Cooccurrence	Experiments	Textmining	Score
recD_2	exodeoxyribonuclease V alpha chain (496 aa)	●			●	0.850
CT_683	TPR repeat-containing protein (335 aa)	●			●	0.706
CT_863	hypothetical protein (482 aa)	●			●	0.673
CT_620	hypothetical protein (838 aa)	●			●	0.652
CT_651	hypothetical protein (608 aa)	●			●	0.647

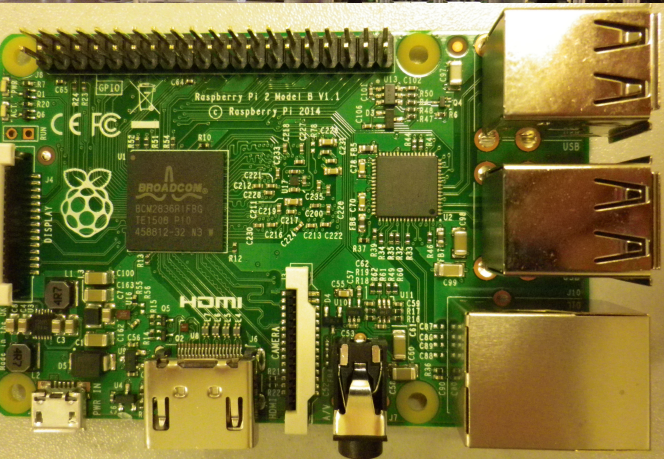
Robson J, Barker D. Comparison of the protein-coding gene content of *Chlamydia trachomatis* and *Protochlamydia amoebophila* using a Raspberry Pi computer. *BMC Research Notes* 8:561.

ClustalX 2.1
File Edit Alignment Trees Colors Quality Help
Mode: Multiple Alignment Model Font: 36
5 taxa in b
Reading bloc
Reading bloc
File reading
ALERT: (ME)
Issues: Sort
and could be
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(java:318)
ntry-passw
(Mesquite) #
(File Dialog: #
(Mesquite) #
In Directory:
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Writing A
File writi
Manage TR
Save File
(File Dialog: #
(Mesquite) #
Note: (Mana
(Note) #
(Mesquite) #
Directory
1 - jar
2 - les
3 - lib
4 - doc
5 - mes
6 - startingMesq
7 - examples/
8 - mesquite.sh
9 - corejava/
10 - _startingM
11 - images/
12 - edu/
13 - com/
14 - org/
Enter number to se
Enter name of file
(File Dialog: File
(Mesquite) # Savin
Note: (Manage TREE
Dialog box shown.
For console choice
Tree file sa
1 (OK)
Enter number of component to select.
(Note) #
(Mesquite) # Dialog closed

```
6014741 DVATVAFCD A QSTQEIHEKVLNEAVG--ALMYHTITLTREDLEKFKALRIIVRIGSGFDNID
28422247 DLATVAFCD A QSTQEIHEKVLNEAVG--AMMYHTITLTREDLEKFKALRVIVRIGSGYDND
148727271 KEELIA-----ELQDCEG--LIVRSATKVTADVINA AEKLVVGRAGTGVDNVD
449272505 -----WYHKPVINEGLLQSLPNLKVVASSGVGIDHLD
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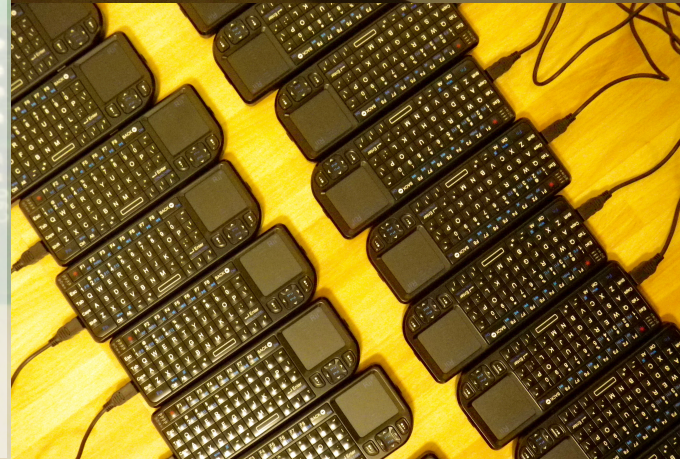
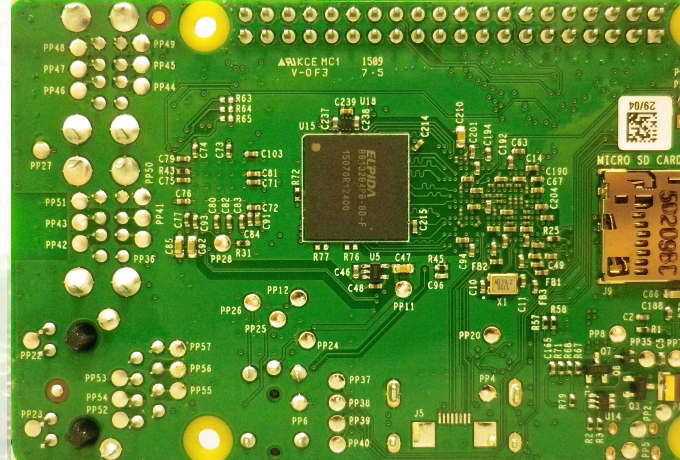


4273 π offers
free loanboxes
for Scottish state schools

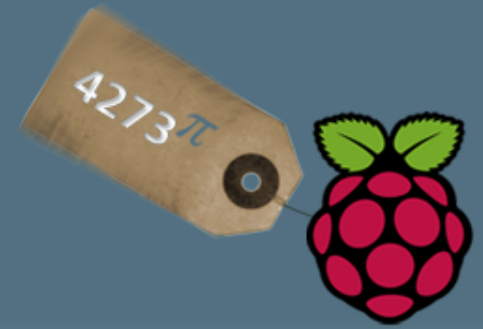
one loanbox contains

- 10x Raspberry Pi 2 B
- 10x USB power adaptor
- 10x USB to micro USB cable
- 10x VGA to HDMI adaptor
- 10x VGA cable
- 10x Rii keyboard
- 10x Pi-Hut 7 USB hub
(extension cords)

- 10x ready to use
32GB Micro SD card
preloaded with 4273 π
customized distribution of
Raspbian GNU/Linux,
bioinformatics teaching
materials, software and
data



<http://4273pi.org>



- Download SD card image
- Request loan box
- Request demonstrations, school events
- Report bugs, make suggestions
- Links to social media
- Stay in touch

Acknowledgements: 4273 π project

Dr Rosanna Alderson, Carnegie Mellon University
Ms Kate Andrews, SSERC
Mrs Emma Barson, Monmouth School
Mr Paul Beaumont, SSERC
Dr Jonathan Bennett, St Paul's School
Ms Lisa Bradshaw, Withington Girls School
Mr David Britz-Colwill, Woodhouse College
Mrs Angela Burgess, Wales Gene Park
Ms Sally Burke, Luton Sixth Form College
Mr David Cable, STFC Daresbury Laboratory
Dr Muriel Comrie, Kilgraston School
Ms Wendy Cotterill, STFC Daresbury Laboratory
Ms Kath Crawford, SSERC
Dr Anne Davies, Whitchurch High School
Ms Maria Dixon, Hitchin Girls' School
Professor Dannie Durand, Carnegie Mellon University
Ms Claire Elder, Craigie High School
Dr David Ferrier, University of St Andrews
Professor Oscar Gaggiotti, University of St Andrews
Mrs Jacqui Gaiser-Porter, Netherhall School
Ms Hilary Gorrie, St Paul's RC Academy
Ms Nicola Haddow, Kirkland HS & Community College
Ms Gemma Harlow, University of St Andrews
Dr Duncan Harvie, Woodmill High School
Mr Ian Harvey, Hills Road Sixth Form College
Ms Abbie Hern, Oakwood Park Grammar School
Dr Matthew Holden, University of St Andrews
Professor Peter Holland, University of Oxford
Dr Chris Illingworth, University of Cambridge
Mr Simon Jankowski, Helsby High School
Professor Peter Kille, Cardiff University
Professor Ian Korf, UC Davis Genome Center

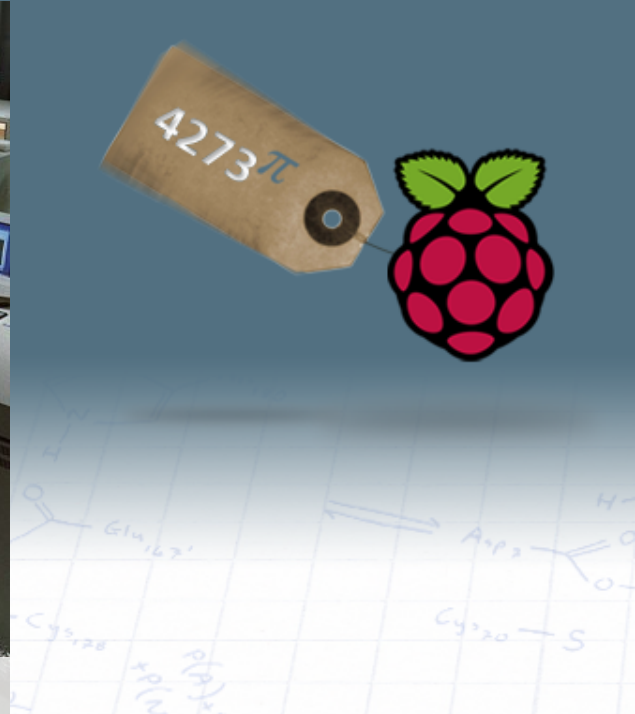
Dr Joe Parker, Royal Botanic Gardens, Kew
Mr Steven Leach, Westminster Academy
Mr Iain Mackie, Woodford County High School
Mr Sean McInerney, The Studio Liverpool
Professor Thomas Meagher, University of St Andrews
Dr John Mitchell, University of St Andrews
Dr James McDonagh, University of Manchester
Mr Duncan Morrison, Bridgewater High School
Dr Michael Morrissey, University of St Andrews
Dr Silvia Paracchini, University of St Andrews
Ms Jane Parker, Bell Baxter High School
Ms Jade Parkinson-Hill, The Studio Liverpool
Mr Ian Parry, Liverpool Life Sciences UTC
Dr Clare Peddie, University of St Andrews
Dr Miguel Pinheiro, University of St Andrews
Dr Heleen Plaisier, University of St Andrews
Dr Gerald Prescott, University of St Andrews
Dr Stephen J. Price, University College London
Professor Michael Ritchie, University of St Andrews
Mr James Robson, University of St Andrews
Mr Alan Runciman, Madras College
Mr Steve Smart, University of St Andrews
Dr Anne Smith, University of St Andrews
Mr Jim Stafford, SSERC
Dr Mhairi Stewart, University of St Andrews
Mr Stuart Sweeney, Forfar Academy
Mrs Diana Tyler, Ilford County High School
Dr Martyn Winn, STFC Daresbury Laboratory
Ms Kristin Wregglesworth, University of St Andrews
Dr Yannick Wurm, Queen Mary, University of London
Mr Fred Young, SSERC

Users and bug-reporters everywhere. E&OE.

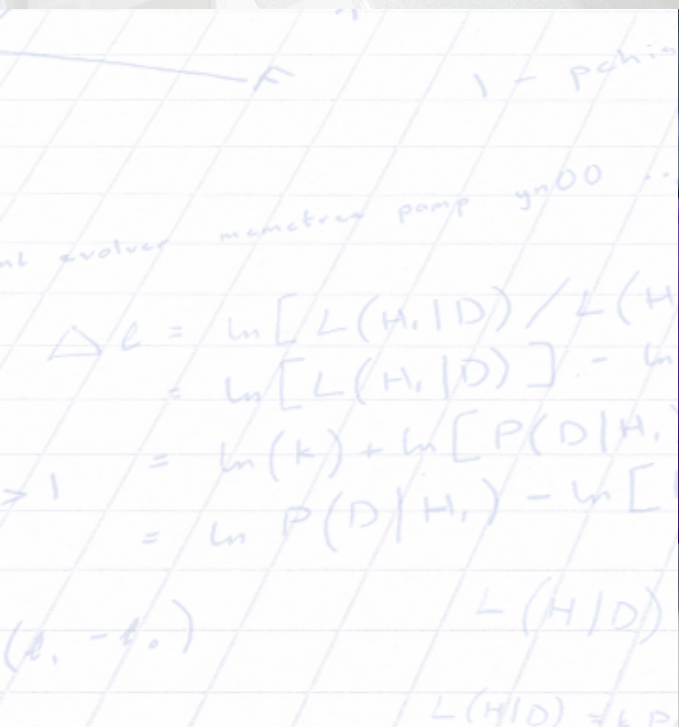
Funding: University of Edinburgh; University of St Andrews; SFC; Scottish Government; STFC.

4273 π





<http://www.yourgenome.org/stories/scaling-up-for-the-human-genome-project>



Oxford Nanopore, <https://vimeo.com/127689863>