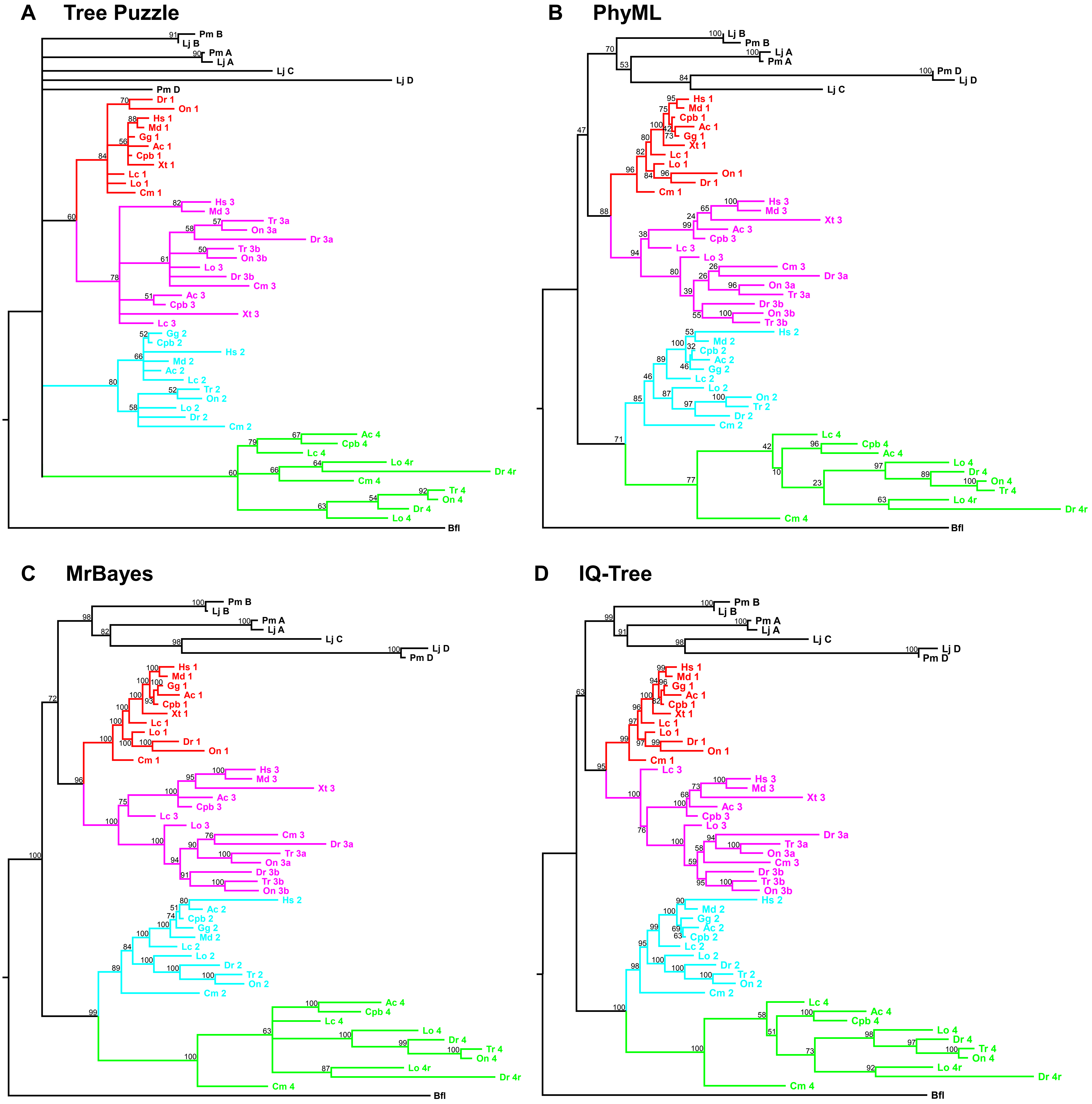
Additional File 4. Rooted phylogenetic trees.

Phylogenetic trees showing the inferred relationships of Dact proteins. All trees are based on the alignment shown in Additional File 20. JTT had been determined as the most suitable model. Gamma distribution shape parameter (G) using four rate categories and the proportion of invariable sites (I) were estimated by the respective programme. The trees are rooted from the *Branchiostoma* Dact sequence.
(A) Tree reconstruction by quartet puzzling using Tree Puzzle 5.2, log likelihood -17586. Numbers indicate likelihood values. (B) Maximum likelihood tree using PhyML 3.0, log likelihood -17300. Numbers indicate bootstrap values. (C) Bayesian tree using MrBayes 3.2, log likelihood -17271. Numbers indicate credibility values. (D) Maximum likelihood tree using IQ-Tree, log likelihood -17130. Numbers indicate bootstrap values.
All trees support the Dact1/3-Dact2/4 dichotomy. In addition, trees B-D indicate possible monophyly of the cyclostome dactA-D genes, though the quartet puzzling highlights that this branch is ambiguous.


A
Tree Puzzle
91
Pm B
Lj B
90
Pm A
Lj A
Lj C
Lj D
Pm D
70
Dr 1
On 1
88
Hs 1
Md 1
Gg 1
56
Ac 1
Cpb 1
Xt 1
84
Lc 1
Lo 1
Cm 1
82
Hs 3
Md 3
60
57
Tr 3a
58
On 3a
Dr 3a
50
Tr 3b
On 3b
61
Lo 3
78
Dr 3b
Cm 3
51
Ac 3
Cpb 3
Xt 3
Lc 3
52
Gg 2
Cpb 2
Hs 2
66
Md 2
Ac 2
Lc 2
80
52
Tr 2
On 2
58
Lo 2
Dr 2
Cm 2
67
Ac 4
79
Cpb 4
Lc 4
64
Lo 4r
60
66
Dr 4r
Cm 4
92
Tr 4
On 4
54
Dr 4
63
Lo 4
Bfl
B
PhyML
100
Lj B
Pm B
70
100
Lj A
53
Pm A
100
Pm D
Lj D
84
Lj C
95
Hs 1
Md 1
75
Cpb 1
100
42
Ac 1
73
Gg 1
80
Xt 1
82
Lc 1
47
Lo 1
96
96
On 1
84
Dr 1
Cm 1
100
Hs 3
65
Md 3
88
24
Xt 3
99
Ac 3
38
Cpb 3
Lc 3
94
Lo 3
26
Cm 3
80
26
Dr 3a
96
On 3a
39
Tr 3a
Dr 3b
55
100
On 3b
Tr 3b
53
Hs 2
100
Md 2
32
Cpb 2
89
Ac 2
46
Gg 2
46
Lc 2
Lo 2
85
87
100
On 2
97
Tr 2
Dr 2
Cm 2
Lc 4
71
42
Cpb 4
96
Ac 4
10
Lo 4
97
Dr 4
89
100
On 4
Tr 4
23
77
Lo 4r
63
Dr 4r
Cm 4
Bfl
C
MrBayes
100
Pm B
Lj B
98
100
Pm A
82
Lj A
98
Lj C
100
Lj D
Pm D
100
Hs 1
100
Md 1
100
Gg 1
100
Ac 1
93
Cpb 1
72
100
Xt 1
100
Lc 1
100
Lo 1
100
100
100
Dr 1
On 1
Cm 1
100
Hs 3
95
Md 3
96
Xt 3
100
Ac 3
75
Cpb 3
Lc 3
100
Lo 3
76
Cm 3
100
90
Dr 3a
100
Tr 3a
94
On 3a
Dr 3b
91
100
Tr 3b
On 3b
100
80
Hs 2
51
Ac 2
74
Cpb 2
100
Gg 2
100
Md 2
84
Lc 2
100
Lo 2
89
100
Dr 2
100
Tr 2
On 2
Cm 2
99
100
Ac 4
Cpb 4
Lc 4
63
100
Lo 4
99
Dr 4
100
Tr 4
100
On 4
87
Lo 4r
Dr 4r
Cm 4
Bfl
D
IQ-Tree
100
Pm B
Lj B
99
100
Pm A
91
Lj A
98
Lj C
100
Lj D
Pm D
99
Hs 1
Md 1
94
96
Gg 1
100
Ac 1
82
Cpb 1
63
96
Xt 1
97
Lc 1
Lo 1
99
97
99
Dr 1
On 1
Cm 1
95
Lc 3
100
Hs 3
73
Md 3
100
68
Xt 3
100
Ac 3
Cpb 3
76
Lo 3
94
Dr 3a
100
100
Tr 3a
58
On 3a
59
Cm 3
Dr 3b
95
100
Tr 3b
On 3b
90
Hs 2
100
Md 2
Gg 2
99
69
Ac 2
63
Cpb 2
95
Lc 2
100
Lo 2
98
100
Dr 2
100
Tr 2
On 2
Cm 2
100
Lc 4
58
100
Ac 4
51
Cpb 4
98
Lo 4
97
Dr 4
100
Tr 4
73
On 4
100
92
Lo 4r
Dr 4r
Cm 4
Bfl