



Lampiran 1: *Source code* program matriks jarak Jukes-Cantor dan matriks

jarak Kimura

```
clc;
fprintf('\nInput Data Barisan\n');
fprintf('=====\n\n');
in = input('Ketik nama file: ','s');
% input data barisan dari textfile
file = fopen(in,'r');
i=1;
while 1
    a{i} = fgetl(file);
    if a{i}==-1,
        break;
    end
    i = i+1;
end
N=1;
c=1;
while c~=i,
    if a{c}(1)=='>',
        sp{N} = a{c}(2:length(a{c}));
        c = c+1;
        s{N}=a{c};
    end
    c = c+1;
    while a{c}(1)~='/',
        s{N}=[s{N} a{c}];
        c = c+1;
    end
    c = c+1;
    N = N+1;
end
N = N-1;
n = length(s{1});
mjc = zeros(N,N);
mk = zeros(N,N);
% proses reduced multiple alignment
kb=1;
for k = 1:n,
    gap=0;
    for i = 1:N,
        if s{i}(k)=='-' || s{i}(k)=='n' || s{i}(k)=='N',
            gap=1;
            break;
        end
    end
end
```

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        end
    end
    if gap == 0,
        for i = 1:N,
            sb{i}(kb)=s{i}(k);
        end
        kb = kb+1;
    end
end
nb = kb-1;
% proses pembentukan matriks jarak
for i = 1:N,
    for j = i+1:N,
        % hitung transisi dan transversi
        r1=0;
        r2=0;
        for k = 1:nb,
            if sb{i}(k) ~= sb{j}(k),
                switch sb{i}(k)
                    case 'a'
                        if sb{j}(k)=='g',
                            r1 = r1+1;
                        else
                            r2 = r2+1;
                        end
                    case 'A'
                        if sb{j}(k)=='G',
                            r1 = r1+1;
                        else
                            r2 = r2+1;
                        end
                    case 'g'
                        if sb{j}(k)=='a',
                            r1 = r1+1;
                        else
                            r2 = r2+1;
                        end
                    case 'G'
                        if sb{j}(k)=='A',
                            r1 = r1+1;
                        else
                            r2 = r2+1;
                        end
                    case 'c'
                        if sb{j}(k)=='t',
                            r1 = r1+1;
                        else
                            r2 = r2+1;
                        end
                end
            end
        end
    end
end

```

```

        case 'C'
            if sb{j}(k)=='T',
                r1 = r1+1;
            else
                r2 = r2+1;
            end
        case 't'
            if sb{j}(k)=='c',
                r1 = r1+1;
            else
                r2 = r2+1;
            end
        otherwise
            if sb{j}(k)=='C',
                r1 = r1+1;
            else
                r2 = r2+1;
            end
        end
    end
end
% hitung jarak tiap pasang barisan
mjc(i,j) = -3*log(1-4*(r1+r2)/nb/3)/4;
mjc(j,i) = jc(i,j);
mk(i,j) = -log((1-2*r1/nb-r2/nb)*(1-2*r2/nb)^(1/2))/2;
mk(j,i) = mk(i,j);
end
end
fprintf('\nPilih Metode\n');
fprintf('=====\n\n');
fprintf('1. Jukes-Cantor\n');
fprintf('2. Kimura\n');
pm = input('Pilih : ');
fprintf('\nOutput Matriks Jarak\n');
fprintf('=====\n\n');
% output matriks jarak ke textfile
out = input('Ketik nama file : ','s');
fid = fopen(out,'w');
if pm==1,
    for i = 1:N,
        fprintf(fid,'%s',sp{i});
        for j = 1:N,
            fprintf(fid,' %f',mjc(i,j));
        end
        fprintf(fid,'\r\n');
    end
end
if pm==2,
    for i = 1:N,

```

```
fprintf(fid, '%s', sp{i});  
for j = 1:N,  
    fprintf(fid, ' %f', mk(i,j));  
end  
fprintf(fid, '\r\n');  
end  
end  
fclose(fid);
```



## Lampiran 2: Data barisan DNA kelompok Khamir koleksi

Wellyzar Sjamsuridzal, Ph.D.

### 1. *Crypto/dimennae/AF075489*

TAAGCGGAGGAAAAGAACTAACAAGGATTCCCTTAGTAACGGCGAGTGAACCGGGA  
AGAGCTCAAATTTGTAATCTGGCGTCCTTCGGGCGTCCGAGTTGTAATCTATAGAGG  
TGTTTTCCGCGCCGGACCACGTTTAAGTCTCCTGGAACGGAGTATCAAAGAGGGTGA  
CAATCCCGTGCTTGACGTGACGACCGGTGCTATGTGATACACTCTCAACGAGTCGAG  
TTGTTTGGGAATGCAGCTCTAAACGGGTGGTAAATTCATCTAAGGCTAAATATTGG  
CGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAG  
AGAGTTAAACAGCACGTGAAATTGTTAAAAGGGAAACGATTGAAGTCAGTCGTGCAC  
TTGGTATTGACCCGTCTCTGGCGGTGATTTGCCTTGTGCGGGTCAACATCAGTTCT  
GACCGGCGGAAAAGGGCTGGAAGAAGGTGGCACCCTCGGGTGTGTTATAGCTTCCTG  
TCGTATACGTCCGTTGGGACTGAGGAATGCAGCTTGCCGCAAGCCGGGGTTCCGCCA  
CGTTCAAGCTTAGGATGTTGACATAATGGCTTTAAACGACCCGTCTTGAAACACG

### 2. *Cryp/curvatus/AF189834*

GCTCAAATTTGTAATCTGGCAGTCTTCGATTGTCCGAGTTGTAATCTATAGAAGTGT  
TTTCCGTGCCGGACCATGTCTAAGTCCCTTGGAATAGGGTATCAAAGAGGGTGACAA  
TCCCGTACTTGATATGACCACCGGTGCTCTGTGATACACTTTCTACGAGTCGAGTTG  
TTTGGGAATGCAGCTCAAATGGGTGGTAAATTCATCTAAAGCTAAATATTGGCGA  
GAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAGA  
GTTAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGTTCTTT  
AGACTCAGCCGGTTCTTCCGGTCTACTTCTATTGAACGGGTCAACATCAGTTTTGTC  
CGATGGATAAAGGTAGAAGGAATGTAGCTTCCTCGGAAGTGTATAGCCTTTTATTG  
CATACTTGGGTGAGACTGAGGACTGCAGCTCGCCTTTATGGCCGGGGTTCCGCCAC  
GTTCCGAGCTTAGGATGTTGACATAATGGCTTTAAACGACCCGTCTTGAAACACGG

### 3. *Crypt-flavus*/AF075497

TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCGAGCGAAGCGGGA  
 AGAGCTCAAATTTGTAATCTGGCGTCCCTCAGGGCGTCCGAGTTGTAATCTATAGAGA  
 CGTTTTCCGTGCCGGACCGTGTCCAAGTCCCTTGGAACAGGGTATCAAAGAGGGTGA  
 CAATCCCGTACTTGACACGACGACCGGTGCTCTGTGATACGTTTTCTACGAGTCGAG  
 TTGTTTTGGGAATGCAGCTCAAAATGGGTGGTAAATTCCATCTAAAGCTAAATATAGG  
 CGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAG  
 AGAGTTAAACAGTATGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCATGTCC  
 ATTGGATTGAGCTGGTTCTGCCAGTGTATTTCCCTTTGGACGGGTCAACATCAGTTTG  
 AGCCGGCGGATAATGGCAGAGGGAATGTGGCACCCCGGGTGTGTTATAGCCCTTTG  
 TCGCATACTCGGCCAGACTGAGGAATGCAGCTCGCTTTATGGCCGGGGTTCGCC  
 CACGTACGAGCTTAGGATGTTGGCATAATGGCTTTAAACGACCCGTCTTGAAACACG

### 4. *Crypt/luteolus*/AF075482

TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCGAGCGAACCAGGGA  
 AGAGCTCAAATTTAAAATCTGGCGTCCCTCCGGGCGTCCGAGTTGTAATCTACAGAAG  
 TGTTTTCCGTGCCGGACCGTGTCCAAGTCCCTTGGAATAGGGTATCAAAGAGGGTGA  
 CAATCCCGTACTTGACACGACAACCGGTGCTCTGTGATACACTTTCTACGAGTCGAG  
 TTGTTTTGGGAATGCAGCTCAAAATGGGTGGTAAATTCCATCTAAAGCTAAATATAGG  
 CGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAG  
 AGAGTTAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGTCT  
 GTTGGTTTTAGCCGTTCTGCCGGTGTATTACCAACAGACGGGTCAACATCAGTTTT  
 GAGCGGTGGAAAAGGTAGAGGGAACGTAGCTCCTCCGGGAGTGTATAGCCCTTTA  
 TTGCATACACTGCTTGAGACTGAGGAATGCAGCTCGCTTTATGGCCGGGGTTCGCC  
 CACGTTGAGCTTAGGATGTTGACATAATGGCTTTAAACGACCCGTCTTGAAACACG

### 5. *Crypto/sp*/AF075477

TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCGAGTGAAGCGGGA  
 AGAGCTCAAATTTAAAATCTGGCAGGCTACGCTTGTCCGAATTGTAATCTCGAGAAG  
 TGTTTTCCGCGTTGGCCTGTGTACAAGTCCCTTGGAACAGGGCGTCATAGAGGGTGA  
 GAATCCCGTCCCTTGACACAGACACCCAATGCTTTGTGATACACTCTCAATGAGTCGA  
 GTTGTTTGGGAATGCAGCTCAAAATGGGTGGTAAATTCCATCTAAAGCTAAATACTG  
 GCGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAA  
 GAGAGTCAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGCC  
 TGCCTAGTCTCAGCCTTTTGGTGTACTACTAGGTCGGCAGGTGAGCATCAGTTTGGG  
 AGGATTAACAAGGGAGTTAGGAATGTGGCAACCTCGGTTGTGTTATAGCCTAGCTTC  
 GCATTGATCTTGCTGGACTGAGGAACGCAGTGCGCCCGCAAGGGTTGGTCTTCGGAC  
 ACATTGCACTTAGGATGCTGACATAATGGCTTTAAACGACCCGTCTTGAAACA

## 6. *Crypto/podzolicus/AF075481*

TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCGAGCGAAGCGGGA  
 AGAGCTCAAATTTGAAAGCTGGCGTCTTCGGGCGTCCGCATTGTAATCTATAGAGG  
 CGTTTTCTGTGCTGGACCGTGTCCAAGTCCCTTGGAACAGGGTATCAAAGAGGGTGA  
 CAATCCCGTACTTGACACGACAACCAGTGTCTGTGATACGTCTTCTACGAGTCTGAG  
 TTGTTTGGGAATGCAGCTCAAAATGGGTGGTGAATTCCATCTAAAGCTAAATATTGG  
 CGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAG  
 AGAGTTAAACAGTATGTGAAATTGTTGAAAGGGAAACGATGGAGGTCAGTTCGTGTCT  
 GTGGGATTGAGCCGTCTCTGGCGGTGACTTCCCACAGACGGGTCAACATCAGTTTT  
 GGTTCGGCGGATAAAGGCAGGAGGAAGGTGGCACCCCCGGGTGTGTTATAGCCTCTTG  
 TTGCATACGCTGGCCGAGACTGAGGAATGCAGCTCGCCTTTATGGCCGGGGTTCCGC  
 CACGTTTCGAGCTTAGGATGTTGACATAATGGCCTTCAACGACCCGTCTTGAAACACG  
 G

## 7. *Cysto/bisporidii/AF189832*

TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCGAGTGAAGCGGGA  
 AGAGCTCAAATTTAAAATCTGGCAGTCTACGATTGTCCGAATTGTAATCTCGAGAAG  
 TGTTTTCCGCGTTGGCCTGTGTACAAGTCCCTTGGAACAGGGCGTCATAGAGGGTGA  
 GAATCCCGTCTTGACACAGACACCCAATGCTTTGTGATACACTCTCAATGAGTCGA  
 GTTGTGTTGGGAATGCAGCTCAAAATGGGTGGTAAATTCCATCTAAAGCTAAATACTG  
 GCGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAA  
 GAGAGTCAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGCC  
 TGCCTAGATTCAGCCTTCTGGTGTATTTCTAGGTCGGCAGGTTCAGCATCAGTTTGGG  
 GGGTTAAACAAGGGAGTTAGGAATGTAGCAACCTTCGGTTGTGTTATAGCCTAGCTTC  
 GCATTGATCTCGCTGGACTGAGGAACGCAGTGCGCCCGCAAGGTTGGTCTTCGGACA  
 CATTTCGCACTTAGGATGCTGGCATAATG

## 8. *Cystofi-infirmitatis/AF075505*

TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCGAGTGAAGCGGGA  
 AGAGCTCAAATTTAAAATCTGGCAGGCTACGCTTGTCCGAATTGTAATCTCGAGAAG  
 TGTTTTCCGCGTTGGCCTGTGTACAAGTCCCTTGGAACAGGGCGTCATAGAGGGTGA  
 GAATCCCGTCTTGACACAGACACCCAATGCTTTGTGATACACTCTCAATGAGTCGA  
 GTTGTGTTGGGAATGCAGCTCAAAATGGGTGGTAAATTCCATCTAAAGCTAAATACTG  
 GCGAGAGACCGATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAA  
 GAGAGTCAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGCC  
 TGCCTAGATTCAGCCTTCTGGTGTATTTCTAGGTCGGCAGGTTCAGCATCAGTTTGGG  
 GGGTTAAACAAGGGAGCTGGGAATGTGGCAACCTTTCGGTGTGTTATAGCCAGTTTC  
 GCATTGATCTCGCTGGACTGAGGAACGCAGTGCGCCCGCAAGGTTGGTCTTCGGAC  
 ACATTTCGCACTTAGGATGCTGGCATAATGGCTTTAAACGACCCGTCTTGAAACAC



### 9. *Crypt-heveanensis/af406890*

CTAACAAGGATTCCCTTAGTAACGGCGAGCGAACC GGGAAGAGCTCAAATTTGAAAT  
 CTGGCGTCCCTCAGGGCGTCCGAGTTGTAATCTATAGAGGCGTTTTCCGTGCCGGACC  
 GTGTCCAAGTCCCTTGGAACAGGGTATCAAAGAGGGTGACAATCCCGTACTTGACAC  
 GACTACCGGTGCTCTGTGATACGTCTTCTACGAGTCGAGTTGTTTGGGAATGCAGCT  
 CAAAACGGGTGGTAAACTCCATCTAAAGCTAAATATTGGTGGGAGACCGATAGCGAA  
 CAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAGAGTTAAACAGTATGTG  
 AAATTGTTGAAAGGGAAACGATTGAAGTCAGTCGTGTCCAGAGGACTCAGCCGGTTC  
 TGCCGGTCTACTTCCTCTGGACGGGTCAACATCGTTCTGGACGGCGGATAAGGACG  
 GGAGGAAGGTGGCACCCTCGTGGTGTGTTATAGCCTCCTGTGCATACGTGACCCG  
 GGACCGAGGAACGCAGCTCGCCTTTATGGCCGGGGTTCGCCACGTACGAGCTTAGG  
 ATGTTGACGTAATGGCTTTAAACGAC

### 10. *Crypt/laurentiaj555467*

TTTTTTGTTTGACCTCAAATCAGGTAGGGCTACCCGCTGAACTTAAGCATATCAATA  
 AGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCGAGTGAACCGGGAAG  
 AGCTCAAATTTGAAATCTGGCGTGCTCAGTCGTCGAGTTGTAATCTATAGAGTGC  
 TTTTCCGTGCCGGACTGTGTCCAAGTCCCTTGGAACAGGGTATCAAAGAGGGTGATA  
 ATCCCGTACTTGACACAATGACCGGTGCTCTGTGATACGTCTTCTACGAGTCGAGTT  
 GTTTGGGAATGCAGCTCAAATGGGTGGTGAAGTCCATCTAAAGCTAAATATTGGCG  
 AGAGACCGATAGCGAACCAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGTACGTGAAATTGTTAAAAGGGAAACGATTGAAGTCAGTCGTGACTGA  
 GAGGCTCAGCCGGTCTGCCGGTGTATTCCCCTCAGTCGGGTCAACATCAGTTTTGT  
 TCGGTGGATAAGGGCAGTTGGAAGGTGGCACCCTCGGGTGTGTTATAGCCAGCTGTC  
 GCATACATCGGATGAGACTGAGGAATGCAGCTCGCCTTTATGGCCGGGGTTCGCCCA  
 CGTTCGAGCTTAGGATGTTGACATAATGGCTTTAAACGACCCGTCTTGAAACACGGA  
 CCAAGGAGTCTAACATATCTGCGAGTGTGTTGGGTGG

Lampiran 3: Data barisan DNA kelompok Khamir koleksi

Wellyzar Sjamsuridzal, Ph.D. setelah dilakukan

proses *multiple alignment* dengan aplikasi ClustalX Versi 1.83

**1. Crypt-flavus/AF075497**

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-----  
-----TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCG  
AGCGAAGCGGGAAGAGCTCAAATTTGTAATCTGGCGTCCTCAGGGCGTCC  
GAGTTGTAATCTATAGAGACGTTTTCCGTGCCGGACCGTGTCCAAGTCCC  
TTGGAACAGGGTATCAAAGAGGGTGACAATCCCGTACTTGACAC-GACGA  
CCGGTGCTCTGTGATACGTTTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
CTCAAAATGGGTGGTAAATTCATCTAAAGCTAAATATAGGCGAGAGACC  
GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
AGTTAAACAGTATGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCA  
TGTCCAT-TGGATTCAGCTGGTTCTGCCAGTGTATTTCTT-TGGACGGG  
TCAACATCAGTTTGAGCCGGCGGATAATGGCAGAGGGAATGTGGCACCCC  
CGG--GTGTGTTATAGCCCTTTGTGCGATACGTCCGCCAGACTGAGGAA  
TGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTACGAGCTTAGGATG  
TTGGCATAATGGCTTTAAACGACCCGTCTTGAAACACG-----  
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**2. Crypt-heveanensis/af406890**

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-----  
-----CTAACAAGGATTCCCTTAGTAACGGCG  
AGCGAACCGGGAAGAGCTCAAATTTGAAATCTGGCGTCCTCAGGGCGTCC  
GAGTTGTAATCTATAGAGCGTTTTCCGTGCCGGACCGTGTCCAAGTCCC  
TTGGAACAGGGTATCAAAGAGGGTGACAATCCCGTACTTGACAC-GACTA  
CCGGTGCTCTGTGATACGTCTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
CTCAAAACGGGTGGTAAACTCCATCTAAAGCTAAATATTGGTGGGAGACC  
GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
AGTTAAACAGTATGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCG  
TGTCCAG-AGGACTCAGCCGGTTCTGCCGGTCTACTTCCTC-TGGACGGG  
TCAACATCGGTTCTGGACGGCGGATAAGGACGGGAGGAAGGTGGCACCCC  
TCGTGGTGTGTTATAGCCTCCTGTGCGATACGTCCGCCAGGACCGGAGGAA  
CGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTACGAGCTTAGGATG  
TTGACGTAATGGCTTTAAACGAC-----  
-----
```

### 3. *Crypto/podzolicus/AF075481*

-----  
 -----TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCG  
 AGCGAAGCGGGAAGAGCTCAAATTTGAAAGCTGGCGTCCTTCGGGCGTCC  
 GCATTGTAATCTATAGAGGCGTTTTCTGTGCTGGACCGTGTCCAAGTCCC  
 TTGGAACAGGGTATCAAAGAGGGTGACAATCCCCTACTTGACAC-GACAA  
 CCAGTGCTCTGTGATACGTCTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
 CTCAAAATGGGTGGTGAATTCCATCTAAAGCTAAATATTGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGTATGTGAAATTGTTGAAAGGGAAACGATGGAGGTCAGTCG  
 TGTCTGT-GGGATTCAGCCGTCTCTGGCGGTGTACTTCCCA-CAGACGGG  
 TCAACATCAGTTTTGGTTCGGCGGATAAAGGCAGGAGGAAGGTGGCACCCC  
 CGG--GTGTGTTATAGCCTCTTGTTCGATACGCTGGCCGAGACTGAGGAA  
 TGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTTTCGAGCTTAGGATG  
 TTGACATAATGGCCTTCAACGACCCGTCTTGAAACACGG-----  
 -----

### 4. *Crypt/laurentiaj555467*

TTTTTTGTTTGACCTCAAATCAGGTAGGGCTACCCGCTGAACTTAAGCAT  
 ATCAATAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCG  
 AGTGAACCGGGAAGAGCTCAAATTTGAAATCTGGCGTGCTCAGTGCGTCC  
 GAGTTGTAATCTATAGAGTCGTTTTCCGTGCCGACTGTGTCCAAGTCCC  
 TTGGAACAGGGTATCAAAGAGGGTGATAATCCCCTACTTGACAC-AATGA  
 CCGGTGCTCTGTGATACGTCTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
 CTCAAAATGGGTGGTGAATTCCATCTAAAGCTAAATATTGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGTACGTGAAATTGTTAAAAGGGAAACGATTGAAGTCAGTCG  
 TGACTION-GAGGCTCAGCCGTTCTGCCGTTGATTCCCCT-CAGTCGGG  
 TCAACATCAGTTTTGTTTCGGTGGATAAAGGCAGTTGGAAGGTGGCACCCCT  
 CGG--GTGTGTTATAGCCAGCTGTTCGCATACATCGGATGAGACTGAGGAA  
 TGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTTTCGAGCTTAGGATG  
 TTGACATAATGGCTTTAAACGACCCGTCTTGAAACACGGACCAAGGAGTC  
 TAACATATCTGCGAGTGTGGGTGG

### 5. *Cryp/curvatus/AF189834*

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 -----  
 -----GCTCAAATTTGTAATCTGGCAGTCTTCGATTGTCC  
 GAGTTGTAATCTATAGAAGTGTTTTCCGTGCCGGACCATGTCTAAGTCCC  
 TTGGAATAGGGTATCAAAGAGGGTGACAATCCCGTACTTGATAT-GACCA  
 CCGGTGCTCTGTGATAACACTTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
 CTCAAAATGGGTGGTAAATTCATCTAAAGCTAAATATTGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCG  
 TGTCTT-TAGACTCAGCCGGTTCTTCCGGTCTACTTCTAT-TGAACGGG  
 TCAACATCAGTTTTGTCCGATGGATAAAGGTAGAAGGAATGTAGCTTCCT  
 CGG--AAGTGTTATAGCCTTTTATTGCATACATTGGGTGAGACTGAGGAC  
 TGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTTTCGAGCTTAGGATG  
 TTGACATAATGGCTTTAAACGACCCGTCTTGAAACACGG-----  
 -----

### 6. *Crypt/luteolus/AF075482*

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 -----  
 -----TAAGCGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAGCGGCG  
 AGCGAACCGGGAAGAGCTCAAATTTAAAATCTGGCGTCCTTCGGGCGTCC  
 GAGTTGTAATCTACAGAAGTGTTTTCCGTGCCGGACCGTGTCCAAGTCCC  
 TTGGAATAGGGTATCAAAGAGGGTGACAATCCCGTACTTGACAC-GACAA  
 CCGGTGCTCTGTGATAACACTTTCTACGAGTCGAGTTGTTTGGGAATGCAG  
 CTCAAAATGGGTGGTAAATTCATCTAAAGCTAAATATAGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCG  
 TGTCTGT-TGGTTTCAGCCGGTTCTGCCGGTGTATTACCAA-CAGACGGG  
 TCAACATCAGTTTTGAGCGGTGAAAAAGGTAGAGGGAACGTAGCTCCTC  
 CGG--GAGTGTTATAGCCTTTTATTGCATACACTGCTTGAGACTGAGGAA  
 TGCAGCTCGCCTTTATGG-CCGGGGTTCGCCACGTTTCGAGCTTAGGATG  
 TTGACATAATGGCTTTAAACGACCCGTCTTGAAACACG-----  
 -----

## 7. *Crypto/dimennae/AF075489*

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 -----TAAGCGGAGGAAAAGAACTAACAAGGATTCCCTTAGTAACGGCG  
 AGTGAACCGGGAAGAGCTCAAATTTGTAATCTGGCGTCCTTCGGGCGTCC  
 GAGTTGTAATCTATAGAGGTGTTTTCCGCGCCGGACCACGTTTAAGTCTC  
 CTGGAACGGAGTATCAAAGAGGGTGACAATCCCGTGCTTGACGT-GACGA  
 CCGGTGCTATGTGATACACTCTCAACGAGTCGAGTTGTTTGGGAATGCAG  
 CTCTAAACGGGTGGTAAATTCATCTAAGGCTAAATATTGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTTAAACAGCACGTGAAATTGTTAAAAGGGAAACGATTGAAGTCAGTCG  
 TGCACCT-GGTATTCAGCCGTCTCTGGCGGTGTATTTGCCT-TGTGCGGG  
 TCAACATCAGTTCTGACCGGCGGAAAAGGGCTGGAAGAAGGTGGCACCCCT  
 CGG--GTGTGTTATAGCTTCCTGTCGTATACGTCGGTTGGGACTGAGGAA  
 TGCAGCTTGCCGCAA--G-CCGGGGTTCGCCACGTTCAAGCTTAGGATG  
 TTGACATAATGGCTTTAAACGACCCGTCTTGAAACACG-----  
 -----

## 8. *Cysto/bisporidii/AF189832*

-----  
 -----TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCG  
 AGTGAAGCGGGAAGAGCTCAAATTTAAAATCTGGCAGTCTACGATTGTCC  
 GAATTGTAATCTCGAGAAGTGTTTTCCGCGTTGGCCTGTGTACAAGTCCC  
 TTGGAACAGGGCGTCATAGAGGGTGAGAATCCCGTCCTTGACACAGACAC  
 CCAATGCTTTGTGATACACTCTCAATGAGTCGAGTTGTTTGGGAATGCAG  
 CTCAAATGGGTGGTAAATTCATCTAAAGCTAAATACTGGCGAGAGACC  
 GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG  
 AGTCAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCG  
 TGCCTGCCTAGATTCAGC-----CTTCTGGTGTATTTCTAGGTCGGCAGG  
 TCAGCATCAGTTTGGGGGGTTAACAAGGGAGTTAGGAATGTAGCAACCT  
 CGG--TTGTGTTATAGCCTAGCTTCGCATTGATCTCGCTGGACTGAGGAA  
 CGCAGTGCGCCCGCAAGG-TTGGTCTTCGGACACATTTCGCACTTAGGATG  
 CTGGCATAATG-----  
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## 9. *Cystofi-infirno-miniatum*/AF0

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-----TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCG
AGTGAAGCGGGAAGAGCTCAAATTTAAAATCTGGCAGGCTACGCTTGTCC
GAATTGTAATCTCGAGAAGTGTTTTCCGCGTTGGCCTGTGTACAAGTCCC
TTGGAACAGGGCGTCATAGAGGGTGAGAATCCCGTCCTTGACACAGACAC
CCAATGCTTTGTGATACACTCTCAATGAGTCGAGTTGTTTGGGAATGCAG
CTCAAAATGGGTGGTAAATTCATCTAAAGCTAAATACTGGCGAGAGACC
GATAGCGAACAAGTACCGTGAGGGAAAGATGAAAAGCACTTTGGAAAGAG
AGTCAAACAGTACGTGAAATTGTTGAAAGGGAAACGATTGAAGTCAGTCG
TGCCTGCCTAGATTCAGC-----CTTCTGGTGTATTTCTAGGTCGGCAGG
TCAGCATCAGTTTGGGGGGGTTAACAAGGGAGCTGGGAATGTGGCAACCT
TCG--GTGTGTTATAGCCAGTTTCGCATTGATCTCGCTGGACTGAGGAA
CGCAGTGCGCCCGCAAGGGTTGGTCTTCGGACACATTTCGCACTTAGGATG
CTGGCATAATGGCTTTAAACGACCCGTCCTTGAAACAC-----
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## 10. *Crypto/sp*/AF075477

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-----TAAGTGGAGGAAAAGAACTAACAAGGATTCCCCTAGTAACGGCG
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CTCAAAATGGGTGGTAAATTCATCTAAAGCTAAATACTGGCGAGAGACC
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TCAGCATCAGTTTGGGAGGATTAACAAGGGAGTTAGGAATGTGGCAACCT
CGG--TTGTGTTATAGCCTAGCTTCGCATTGATCTTGCTGGACTGAGGAA
CGCAGTGCGCCCGCAAGGGTTGGTCTTCGGACACATTTCGCACTTAGGATG
CTGACATAATGGCTTTAAACGACCCGTCCTTGAAACA-----
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