

**Universidade de Lisboa  
Faculdade de Farmácia**



**Classification of dermatophytes by a multilocus phylogenetic approach  
based on Tef-1 $\alpha$ , beta tubulin and ITS genes**

**Carolina Pedro Gomes Tomé**

**Mestrado Integrado em Ciências Farmacêuticas**

**2019**

**Universidade de Lisboa  
Faculdade de Farmácia**



**Classification of dermatophytes by a multilocus phylogenetic approach  
based on Tef-1 $\alpha$ , beta tubulin and ITS genes**

**Carolina Pedro Gomes Tomé**

**Monografia de Mestrado Integrado em Ciências Farmacêuticas apresentada à  
Universidade de Lisboa através da Faculdade de Farmácia**

**Orientador: Doutora Maria Manuel Pereira Lopes, Professora Auxiliar**

**Co Orientador: Doutora Rosalie Sacheli, Investigadora**

**Entidades patrocinadoras: Centro Hospitalar da Universidade de Liège**

**2019**

## Resumo

Os dermatófitos são fungos que têm a capacidade de invadir tecidos queratinizados de humanos e de outros animais. As infecções causadas por dermatófitos são comumente conhecidas como tinhas, e podem afetar a pele, cabelos e unhas.

Este estudo diz respeito a *Trichophyton mentagrophytes*, *Trichophyton interdigitale*, *Trichophyton violaceum* e *Trichophyton soudanense*, quatro espécies conhecidas por causar *Tinea capitis*, uma infecção que afeta os folículos capilares sendo predominantemente uma doença que afecta crianças pré-adolescentes.

Embora as dermatofitoses não sejam consideradas de natureza urgente, são um problema de Saúde Pública. O aumento dramático da incidência das dermatofitoses e a necessidade de aumentar o nosso conhecimento acerca da ecologia e epidemiologia dos dermatófitos têm implicado uma investigação mais intensa em métodos de diagnóstico para identificação rápida e precisa destes patogéneos fúngicos.

A filogenia dos dermatófitos, no entanto, permanece incerta, porque os seus membros são filogeneticamente e taxonomicamente muito próximos e as suas características fenotípicas às vezes são precárias.

Este trabalho descreve uma tentativa de um método de identificação de dermatófitos, usando a sequenciação de DNA fúngico de três genes específicos, ITS, BT2 e Tef-1 $\alpha$  para identificar filogeneticamente e distinguir *T. mentagrophytes* de *T. interdigitale* e *T. violaceum* de *T. soudanense*, uma vez que foram identificados erroneamente ao longo dos anos, a fim de fornecer informações sobre a sua taxonomia e promover a possibilidade de efetuar uma terapia direcionada.

Palavras-chave: *Tinea capitis*; *Trichophyton interdigitale*; *Trichophyton mentagrophytes*; *Trichophyton violaceum*, *Trichophyton soudanense*

## Abstract

Dermatophytes have the capacity to invade human keratinized tissues and other animals to produce infections, dermatophytosis. Dermatophyte infections are commonly known as *ringworm* or *Tinea*, and can affect the skin, hair and nails.

This study concerns *Trichophyton mentagrophytes*, *Trichophyton interdigitale*, *Trichophyton violaceum* and *Trichophyton soudanense*, four species known to cause *Tinea capitis*, an infection that affects the hair follicles. It is predominantly a disease of preadolescent children.

Although a dermatophyte infection is not an emergency, the dramatic increase in the incidence of opportunistic fungal infections and the need to increase our knowledge of the dermatophytes ecology and epidemiology has led to a critical need for diagnostic methods that can rapidly and accurately identify fungal pathogens.

The phylogeny of dermatophytes, however, remains unclear because their members are phylogenetically and taxonomically very closely related, and their phenotypic features are sometimes poor.

This project describes an attempt to establish a method of identification of dermatophytes by sequencing the fungus DNA, Internal transcribed spacer (ITS) , Beta tubulin gene (BT2) and the nucleotide sequence of translation elongation factor 1- $\alpha$  (*Tef-1 $\alpha$* ) were used as tools to identify phylogenetically these four species, and distinguish *T. mentagrophytes* from *T. interdigitale* and *T. violaceum* from *T. soudanense*, since they have been misidentified over the years, in order to provide information about their taxonomy and promote the possibility for a targeted therapy.

Key words: *Tinea capitis*; *Trichophyton interdigitale*; *Trichophyton mentagrophytes*; *Trichophyton violaceum*, *Trichophyton soudanense*

## Agradecimentos

Em primeiro lugar, gostaria de demonstrar a minha enorme gratidão à Professora Maria Manuel da Faculdade de Farmácia da Universidade de Lisboa pela sua ajuda ao longo da elaboração deste projeto, pela disponibilidade e apoio que sempre demonstrou, e pela enorme paciência.

Seguidamente gostaria de agradecer à professora Marie-Pierre Hayette do *Centre Hospitalier Universitaire de Liège*, que me proporcionou a oportunidade de trabalhar e conhecer um pouco melhor esta área e tornou possível o desenvolvimento deste trabalho.

Teço um grande agradecimento à professora Rosalie Sacheli, *Centre Hospitalier Universitaire de Liège*, pelo constante apoio e dedicação, e especialmente pelo acompanhamento que me deu durante os três meses que estive na Bélgica.

Gostaria também de agradecer ao Fabrice, pela sua boa disposição constante e pela forma sempre calorosa como me acolheu no laboratório.

Aos amigos que conheci em Liège, um agradecimento parece-me pouco, vocês tornaram o meu Erasmus numa das minhas melhores recordações.

Aos meus amigos da FFUL, que me acompanharam durante 5 anos que passaram a correr, um obrigada especial, vocês ensinaram-me que não importa quanto tempo passou, mas sim a intensidade como vivemos cada momento.

Aos meus amigos da AMSC, que no fundo são e serão sempre a família que eu escolhi.

Aos meus pais, que estão sempre presentes em todas as minhas conquistas e derrotas, pelo seu apoio incondicional, ao meu irmão Herberto por ser um exemplo para mim, à Mariana e à Sara, que foram e sempre serão uma constante na minha vida, e ao Miguel por ser o meu porto seguro.

## **Acknowledgments**

Firstly, I would like to show my deep gratitude to Professor Maria Manuel from Faculty of Lisbon of University of Lisbon for her help throughout the writing of this project, for her constant availability, support and for always being patient with me.

Next, I would like to thank Professor Marie-Pierre Hayette from *Centre Hospitalier Universitaire de Liège*, who granted me the opportunity to work and to learn more about this area, and who made possible the development of my thesis.

I am very grateful to Professor Rosalie Sacheli, from *Centre Hospitalier Universitaire de Liège*, for her constant help and dedication, and especially for the support she gave me during the three months I spent in Liège.

I would also want to thank Fabrice for his constant joy and kindness, and for always making me feel welcome in the laboratory.

To the friends I met in Liège, a thank you is not enough. You made my Erasmus in one of my favourite memories.

To my FFUL friends, who accompanied me for 5 years who taught me that time is not important, only the intensity as we live each moment.

To my AMSC friends, who have been and will be, always, the family I chose.

To my parents, who are always present in all my achievements and defeats, for their unconditional support, to my brother Herberto, who is an example for me, to Mariana and to Sara, who have been and always will be a constant in my life and to Miguel, for being my safe harbour.

## List of Contents

Resumo.....	3
Abstract.....	4
Agradecimentos.....	5
Acknowledgements.....	6
List of Contents.....	7
List of Figures.....	8
List of Tables.....	8
List of Abbreviations.....	10
1. General Introduction.....	11
1.1 Dermatophytes.....	11
1.2 Tinea Capitis.....	12
1.3 Importance of Diagnosis.....	15
1.4 Diagnostic Methods.....	16
1.4.1 Traditional Methods.....	16
1.4.2 Molecular Methods.....	17
2. Objectives.....	22
3. Materials and Methods.....	23
3.1 Strains.....	23
3.2 Culture Conditions.....	23
3.3 DNA Extraction.....	23
3.3.1 Maxwell Procedure.....	24
3.4 DNA Amplification.....	25
3.4.1 PCR.....	25
3.5 Sequence Method.....	27
3.5.1 Purification of the PCR products.....	27
3.5.2 Sequencing Reaction.....	27
3.5.3 Purification of the sequencing reaction.....	28
3.6 Phylogenetic Analysis.....	29
4. Results.....	30
4.1 Classification of the strains by sequencing method and later analysis in CBS and BLAST database.....	30
4.2 Phylogenetic Analysis.....	32
5. Discussion.....	35
5.1 Strains Identification .....	35
5.1.1 ITS.....	35
5.1.2 $\beta$ - Tubulin Gene.....	36
5.1.3 Tef-1 $\alpha$ .....	36
5.2 Amplification and sequencing of DNA.....	36
5.3 Phylogenetic analysis.....	37
6. Conclusion.....	38
7. Future Perspectives.....	38
8. Bibliography.....	39
9. Annexes.....	44

## List of Tables

Table 1: Primers of ITS, BT2 and Tef-1 $\alpha$ used to amplify dermatophytes DNA...	25
Table 2: ITS program of PCR technique.....	25
Table 3: Tef-1 $\alpha$ program of PCR technique.....	25
Table 4: BT2 program of PCR technique.....	26
Table 5: Reagents and their amounts used in sequencing reaction.....	27
Table 6: Description of the Program applied to sequence the dermatophytes DNA.....	27
Table 7: Discrimination of Species of <i>T. interdigitale</i> sequenced and analysed by CBS and BLAST databases.....	29
Table 8: Discrimination of Species of <i>T. mentagrophytes</i> sequenced and analysed by CBS and BLAST databases.....	30
Table 9: Discrimination of Species of <i>T. violaceum</i> sequenced and analysed by CBS and BLAST databases.....	30
Table 10: Discrimination of Species of <i>T. soudanense</i> sequenced and analysed by CBS and BLAST databases.....	31
Table 11: Results of ITS sequencing in <i>T. interdigitale</i> and <i>T. mentagrophytes</i> .	44
Table 12: Results of Tef-1 $\alpha$ sequencing in <i>T. interdigitale</i> and <i>T. mentagrophytes</i> .....	56
Table 13: Results of BT2 sequencing in <i>T. interdigitale</i> and <i>T. mentagrophytes</i> ..	65
Table 14: Results of ITS sequencing in <i>T. soudanense</i> and <i>T. violaceum</i> .....	71
Table 15: Results of Tef-1 $\alpha$ sequencing in <i>T. soudanense</i> and <i>T. violaceum</i> .....	82
Table 16: Results of ITS sequencing in <i>T. soudanense</i> and <i>T. violaceum</i> .....	91

## List of Figures

Fig 1: Tinea capitis kerion-type.....	11
Fig 2: Diagram of the DNA IQ Reference Sample Kit/Maxwell 16 Instrument.....	24
Fig 3: Dendrogram representing the phylogenetic differentiation of <i>T. mentagrophytes</i> , <i>T. interdigitale</i> , <i>T. soudanense</i> , and <i>T. violaceum</i> .....	32
Fig 4: Representation of the rDNA gene complex in fungi denoting gene order and position of the ITS.....	35

## List of Abbreviations

aLRT: Approximate likelihood ratio test

BLAST: Basic Local Alignment Search Tool database

BCP: Bromocresol purple

BT2:  $\beta$  Tubulin Gene

CBS: Centraalbureau voor Schimmelcultures database

DMSO: Dimethyl sulfoxide

DNA: Deoxyribonucleic acid

dNTP: Deoxyribonucleotide triphosphate

GTR: Generalised time reversible

HPLC: High performance liquid chromatography

IHEM: Belgian Coordinated Collections of Microorganisms

ITS: Internal transcribed spacer

mtDNA: Mitochondrial DNA

MUSCLE: Multiple Sequence Comparison by Log-Expectation

PCR: Polymerase chain reaction

PCR-RFLP: Polymerase chain reaction - Restriction fragment length polymorphism

PhyML: Phylogeny software

rDNA: Ribosomal DNA

RT PCR: Real time Polymerase chain reaction

Tef-1 $\alpha$ : Translation elongation factor 1- $\alpha$  gene

T. inter: *Trichophyton interdigitale*

T. menta: *Trichophyton mentagrophytes*

T. soud: *Trichophyton soudanense*

T. viol: *Trichophyton violaceum*

UV: Ultraviolet radiation

## 1. General Introduction

### 1.1 Dermatophytes

Dermatophytes are the most common, superficial, filamentous fungi that cause skin, hair and nail infections (1). They are a unique, highly specialized, and a closely interrelated group of filamentous fungi that share the peculiar ability to digest and grow on keratinized tissue of the host (2), and usually colonize the non-living, cornified layer of the epidermis, as they are unable to penetrate the deeper tissues of an immunocompetent host (3) (4).

They are classified in three anamorphic genera, based on the conidial morphology and the accessory structures: *Trichophyton*, *Microsporum* and *Epidermophyton* (1).

Based on their ecology, dermatophytes have been divided into three groups, as anthropophilic, zoophilic, and geophilic species (4). Anthropophilic dermatophytes are primarily associated with humans, causing mycoses, and rarely infect animals. Zoophilic species are common pathogens of animals, and occasionally infect humans, whereas geophilic dermatophytes are primarily associated with keratinous materials (i.e., hair, feathers and horns) present in the environment, and they might be transmitted to humans and animals through contact with soil (5).

The distribution of dermatophytes in a given geographical area depends on climate, like a highly humid weather, environmental or socioeconomic factors which tend to change over time, whereby immigration, tourism, poor hygienic conditions and over population (6) (7).

The infection which is caused by these fungi is termed as dermatophytosis and it is the most common fungal infection and one of the most common infectious diseases. The majority of superficial cutaneous fungal infections are caused by 10 of the approximately 40 species of dermatophytes (8).

It is a contagious disease and the severity of the infection depends on the pathogenic attributes of the invading species, and factors associated to host and local environmental conditions (9).

The infections affect different parts of the body and can be divided by those who infect the glabrous skin (*Tinea corporis*, *Tinea cruris*, *Tinea faciei*), the highly keratinised skin

(palms, soles), skin rich in terminal hair follicles (*Tinea capitis*, *Tinea barbae*) and nail infections (10).

## 1.2 *Tinea capitis*

The one that we will be focusing on is *Tinea capitis*, predominantly a disease of preadolescent children.

When the hair is invaded by dermatophytes, the infections are classified as favus, endothrix, or ectothrix.

Favus is inflammatory, characterized by yellow, cupshaped crusts around the hair shafts.

Endothrix hair invasion where hyphae grow down the hair follicle and then penetrate the hair shaft. The fungus grows completely within the hair shaft, and the cuticle surface of the hair remains intact. The hyphae within the hair are converted to arthroconidia (spores);

Ectothrix hair invasion where the hyphae invade the hair shaft at mid follicle, then grow out of the follicle and cover the hair surface. Arthroconidia may develop both within and without the hair shaft. The arthroconidia that surround the hair have the appearance of a sheath. Ectothrix hair invasion develops in a manner similar to endothrix except that the hyphae destroy the hair cuticle and grow around the exterior of the hair shaft. The hyphae are subsequently converted into infectious arthroconidial spores (11).

In very severe forms, a frank kerion may be formed which is a swollen mass, discharging pus, as we can see in Figure 1 (10).



Figure 1: *Tinea capitis* kerion-type (10).

These infections frequently spread among family members and classmates. Certain hairdressing practices such as shaving of the scalp, plaiting or the use of hair oils may promote disease transmission, but their precise role remains the subject of study (12).

Until recently, *Tinea capitis* was thought to have a high prevalence mainly in the developing world because of poor hygiene, overcrowding and low socio-economic standards. During the last few decades, a substantial increase in the prevalence of mycotic scalp infection and a remarkable change in the pattern of the causative dermatophytes among different European countries have been observed. Moreover, in most countries differences have been found between rural and urban areas (13).

Over the last few years there have been some significant changes in the reported incidences with an overall increase in the number of cases of anthropophilic infections (14).

Evidence continues to accumulate indicating that *Tinea capitis* poses an increasing public health concern since it is the most common paediatric dermatophyte infection. (11).

There are approximately 30 species that are responsible by *Tinea capitis*. We will focus on four, *Trichophyton mentagrophytes*, *Trichophyton Interdigitale*, *Trichophyton soudanense* and *Trichophyton violaceum* (15).

*T. mentagrophytes* is the second most important pathogen in most countries. It is a prevalent pathogen of human and animal dermatophytosis. It started of being a species complex containing many species and varieties with different morphological characters in the past. With the aid of modern molecular taxonomic analysis, species and varieties of *T. mentagrophytes* species complex have been reduced to four species only, *T. mentagrophytes sensu stricto*, *T. interdigitale*, *T. erinacei*, and *Arthroderma benhamiae*.

Some members of the species complex are zoophilic and have different host predilections: *T. mentagrophytes sensu stricto* infects voles, *T. erinacei* infects hedgehogs, and *A. benhamiae* infect the rodents such as mice and rabbits. Humans sometimes contract infections through close contact with diseased rabbits, dogs, cats and hedgehogs and although some zoophilic varieties of *T. mentagrophytes* produce only minor or subclinical infections in animals, they can initiate a severe inflammatory response in man (7)(16).

*T. interdigitale* is the only dermatophyte taxon that unifies strains of both human and animal-associated lineages (17), but It is mostly anthropophilic and frequently found in man (18).

Microscopically, both varieties possessed septate hyphae with single-celled hyaline microconidia, of which *T. interdigitale* were subspherical to pyriform and *T.*

mentagrophytes were spherical to subspherical. Nevertheless, *T. mentagrophytes* isolates generally had smoother, thin walled, clavate multiseptated macroconidia than *T. interdigitale*. For some isolates, the cultural characteristics were inconsistent, and further testing was required to confirm their identity (18).

However, some authors refer to *T. interdigitale* as a separated species from *T. mentagrophytes* because most *T. interdigitale* and *T. mentagrophytes* isolates could be distinguished on the basis of their gross colonial and microscopic morphology, as the former tended to have powdery to downy colonies and the latter powdery to granular colonies (18) (19) and also, these two species have been distinguished by molecular methods before (20).

Moreover, the phylogeny of this complex remains unclear because the phenotypic features of members of *T. mentagrophytes* complex are poor and many isolates from medical and veterinary samples have lost their sexual activity (21).

From a clinical point of view, because *T. mentagrophytes* complex includes both anthropophilic and zoophilic species, it is important to have a reliable method to identify the species of the complex (22) and also from an epidemiological point of view, it is necessary to determine the variety of *T. mentagrophytes* complex and its origin in order to prevent spread of infection (20) (16).

*Trichophyton violaceum* and *Trichophyton soudanense* are common causes of *Tinea capitis* in parts of Africa and West Asia, respectively, and are a lot of times misidentified and misdiagnosed (23) (24).

Regarding colony morphology and microscopic characteristics, *T. violaceum* isolates were slow-growing, with waxy, glabrous, wrinkled colonies. Colonies were a distinctive, deep, purple-red and sometimes had a white, waxy fringe. Over time, some cultures became fluffy and lost their characteristic colony morphology. Microscopically, there was lack of sporulation.

*T. soudanense* isolates were also slow-growing. Colonies were flat, with a suede-like texture, a spidery edge, and a distinctive yellow or orange-yellow color. Over time, the colonies became folded and pleomorphic. Microscopically, no conidia were seen. Reflexive branching, in which the hypha bends back toward the inoculum site, was observed (23).

*T. soudanense* was reduced to synonymy with *T. violaceum* based on molecular techniques but the unification of *T. soudanense* and *T. violaceum* may conceal

possible evolutionary diversification, since both species have their unique geographical distributions (25)(26).

### 1.3 Importance of diagnosis

Over \$500,000,000 per year are spent globally on medications that target dermatophytosis (26) (17). Additionally, dermatophytosis is considered a public health problem in developed and developing countries, as it is already a problem for immunocompromised patients (27) (28), and its incidence has been increasing (17)(6). However, nowadays, nothing is done in terms of public health measures to control the spread of dermatophyte infection (29).

The dramatic increase in the incidence of opportunistic fungal infections along with the development of new antifungal agents with various spectra of activity and the emergence of antifungal resistance has led to a critical need for diagnostic methods that can rapidly and accurately identify fungal pathogens (6). Also, identification of the dermatophyte species is essential to verify if the infection is due to relapse or due to a newly acquired organism (30) (17) and, most importantly, to start the appropriate treatment at the earliest (9) (31)(32).

Adding to this, there are countless scientific queries that benefit from the ability to discriminate pathogen strains within the species, to apply the preventive strategies for infection, as well as to extend our knowledge in the realm of dermatophytes ecology and epidemiology (2)(33)(34), and also to establish an accurate taxonomy of individual species, because it has changed fundamentally. During the last decade, progress has been made in the modern systematics of dermatophytes, nevertheless some pending issues remain (17) (35).

However, identification of dermatophytes sometimes remains difficult or uncertain due to their overlapping phenotypic characteristics, variability and pleomorphism (3) (4). Accurate and rapid diagnosis of the infection and reliable species identification of the isolates in clinical laboratory are noteworthy issues in clinical studies of dermatophytes and dermatophytosis (36) (1) (29) because if the diagnosis is based on clinical symptoms alone, about 50 % of patients are presumably misdiagnosed (36).

Without the tools necessary to reliably distinguish strains belonging to a singular species of microorganism, investigators would be unable to examine the origins of phylogenetic diversity within a species; track the introduction, maintenance, and disappearance of strains within a community or broaden their understanding of the unique relationship that exists between a pathogen and its host (33).

## 1.4 Diagnostic Methods

### 1.4.1 Traditional Methods

Traditional diagnosis of cutaneous tinea infections have been based on the colony morphology (pigmentation of the surface and reverse sides, topography, texture and rate of growth) and microscopic characteristics (size and shape of macroconidia and microconidia, spirals, nodular organs) in combination with biochemical and physiological tests (nutritional requirements, temperature tolerance, enzyme production, hair perforation and others) (9).

Gross microscopic morphology is the basis of classification and identification of dermatophytes. However, it often varies with culture conditions (3). It involves scraping of the scaling skin, and application of a dilute KOH 10% to 20% solution to look for hyphal elements by light microscopy. Either heat or addition of DMSO 20% to 40% solution can be used to break up the keratinocytes to aid in visualization of the hyphae (27).

In *Tinea capitis*, a UV-A light (Wood's lamp) can be used to identify fluorescence of fungal infected hair shafts. Short, broken, easily removed hairs can also be examined with KOH and heat or DMSO (37).

Moreover, despite a positive KOH preparation, pathogen cultivation may not be possible, especially if antifungal treatment has already been initiated.

Culture-based diagnostics should therefore be conducted (38).

Identifying characters include colony pigmentation, texture, growth rate and distinctive morphological structures, such as micro conidia, macro conidia, spirals, pectinate branches, pedicels and nodular organs. Some usable media are as follows:

1. Urea agar or broth is used to assist gratitude of urease-negative species of *Trichophyton* genera.
2. Bromcresol purple (BCP)-milk solids-glucose agar is used to distinguish dermatophytes as *T. rubrum*, *T. mentagrophytes*, *T. soudanense*, *T. megninii*, *M. persicolor* and *M. equinum*, on the divergence of releasing ammonium ion from casein and the catabolite domination by glucose.
3. Potato flake agar or Cycloheximide amended potato glucose use of isolation, identification of *T. rubrum* by quick red pigmentation in germfree, usual isolates and with relatively antibiotic-susceptible contaminants.

4. Casamino acids-erythritol- albumin medium. It is an extremely useable medium for isolating dermatophytes from heavily contaminated by bacteria or cycloheximide-tolerant such as *C. albicans*.

5. Another isolation medium is (BCP)-casein-yeast extract agar which grows all dermatophytes(39).

Even successful cultivation does not guarantee correct pathogen identification as it may not be sufficiently distinctive in the first culture (38). Also, culture of fungal organisms is usually slow (1-4 weeks), requires considerable skill in identification of the fungus, and has a relatively low sensitivity and specificity (26) because it does not enable differentiation between dermatophytic and non-dermatophytic infections, especially in nail samples, thus has a high false-negative rate: up to 40% of microscopy-positive samples fail to become positive in culture (40)(28)(35).

Furthermore, the results are often misleading due to the pleomorphic appearance and change of colony morphology resulting from subculturing of the strains (41).

Also, the colonies evaluated on specific media, along with analysis of some nutritional requirements or biochemical characters, remain imprecisely identified due to the high similarity and variability in morphology, the pleomorphism phenomenon, and a long time required for emergence of phenotypic characteristics (2).

In addition, some strains cannot be cultivated and hence the pathogen cannot be identified at the species level (31).

Epidemiological studies of dermatophyte infection have now entered a new era with the ability to differentiate strains of fungi by molecular strain typing methods. The epidemiology of many fungal infections can now be studied in more detail (29).

#### 1.4.2 Molecular methods

Molecular techniques appear to offer the promise of faster, more accurate diagnosis of superficial dermatophyte infections, with potential turnaround times of 3 days or less. (36). Molecular techniques are attractive because of their reproducibility, simple handling and degree of skill required in comparison with traditional methods (1). Molecular diagnosis requires extracting fungal DNA from a clinical sample and then the use of various methods of polymerase chain reaction (PCR) to amplify the fungal DNA (42)(4) which enables rapid detection and determination of various dermatophytes from minute amounts of starting materials (18). Several groups have successfully applied PCR technology to the phylogeny and diagnosis of pathogenic fungi, including

dermatophytes (43). PCR technique consists in three steps being the first the denaturation of the double stranded DNA to form a single stranded that can then hybridize with specific primers that will allow the elongation of the chain in order to create several copies.

Several studies have applied molecular diagnostics to fungal infections. During the last decade, a wide variety of DNA-based techniques have become available for studies on species identification, such as species-specific PCR, PCR- Restriction fragment length polymorphism (RFLP), real-time PCR (RT PCR), nested PCR and various targets such as ribosomal-DNA (rDNA),  $\beta$  tubulin gene (BT2), mitochondrial DNA (mtDNA), and others (6). A common argument in favour of these molecular techniques in the scientific reports is that genotypic differences are considered more stable and more precise than phenotypic characteristics (9)(44).

RT PCR is a potentially more sensitive approach that is based on detection with cyber green or with specific fluorophore-labelled oligonucleotide probes.

The RT PCR has several advantages like the omission of post-PCR analysis, which diminish the risk of false-positivity (45) and the increase of sensitivity assay which could markedly improve the investigation of scalp dermatophytoses, where conventional mycology often suffers from low sensitivity due to a combination of low-level or patchy fungal load, heavy encrustation of debris blocking microscopy, and the contamination of samples by clinically ineffective topical antifungals such as ketoconazole from shampoos. In addition, *Tinea capitis* of the elderly, an entity often remaining unrecognised could be further elucidated by RT PCR (46)(47).

However, it is not practical enough for a large number of laboratories that are either small scale or very tightly budget (48).

PCR-RFLP is a technique based on detection of genomic restriction fragments by PCR amplification, which can be used with DNA of any organism and has been proven to be useful for rapid and correct identification of dermatophyte species and able to generate species-specific DNA polymorphisms with many dermatophyte species on the basis of characteristic band patterns detected by agarose gel electrophoresis (49). (50).

Unfortunately, it is a complex technique with poor discriminative power to make an easy and specific diagnosis (48) (47) .

Nested PCR involves the use of two primer sets and two successive PCR reactions and can be used to identify dermatophytes in clinical samples, which is particularly useful for *Tinea capitis* in which adequate treatment depends on the incriminated

dermatophyte and should be initiated as soon as possible, being that it depends on the identification of the source of the infection (48).

Furthermore, it can be used when only a small amount of material is collected for mycological analysis and the number of species that can be identified by sequencing a nested PCR product is unlimited (51).

It was observed to be more sensitive for the detection of dermatophytes than single-round PCR, it is faster than traditional methods and it is helpful for diagnosis of cases with dermatophytoses which were recently treated with antifungal agents, or showed uncultivable filaments (48).

Also, It has been possible to discriminate without ambiguity closely related species such as *T. violaceum* and *T. soudanense* by this method (51).

An inconvenience with nested PCR is the high risk of contamination and the need of two negative controls (51).

Nevertheless, the main disadvantage of these methods is their higher cost relative to other detection methods (27).

With the introduction of molecular methods it has become clear that the phenotypes and genotypes of this group of fungi are not always congruent (26).

To help distinguish this and other species that are usually confused, a lot of methods have been applied, as it was described earlier. One of them, relies on genome sequencing and was developed to study the future outbreaks on the biology, virulence, pathogenicity and the host specificity of the clinically important dermatophytes (52)(31).

#### 1.4.2.1 ITS gene

The ribosomal DNA (rDNA) genes are found in all microorganisms and known to accumulate mutations at a slow constant rate over time. Nucleotide sequence heterogeneity within this region can be used to phylogenetically classify microorganisms. Interspaced among the highly conserved sequences of the rDNA genes are regions of variable sequences called spacer regions historically referred to as spacers since they separate the functional DNA sequences of the various rDNA genes.

Since mutations within the spacer regions of the rDNA gene complex occur with greater frequency than with the rDNA genes, the sequence heterogeneity within this

area has been useful for the separation of both genera and species. Similarly, it is also recognized that eukaryotic cells such as fungi have a rDNA gene complex region with comparable characteristics (53). The intervening ITS regions have become important molecular targets for taxonomy and identification (54).

Due to greater sequence variation and polymorphism (44), the ITS1ITS2 domains are more suited for species and strain identification than the 18s region (small subunit), the 5.8s region and the 28s region (large subunit). For example the 5.8S region is only about 160 bp long and highly conserved within major organism groups.

Several groups have developed methods utilizing the ITS regions to identify species and strains of a range dermatophytes, yeasts and moulds (55)(21).

Most studies have shown that sufficient variation exists within the ITS regions to allow species identification. The ITS regions have been used as targets to investigate the validity of dermatophyte taxonomy, and to determine the phylogenetic relationships among other fungal species by comparing the base pair sequences of the ITS1 regions (22).

Some of the cited studies (and others) have provided ITS sequence information for a variety of fungi and are available in GenBank for analysis using a single representative isolate of each taxon (44)(40).

This ITS based identification system saves time (it takes 2 to 3 days) and is accurate and applicable even to strains with atypical morphological features (22).

Currently, ITS-rDNA sequencing is the golden standard for species delineation of dermatophytes. However, the method is expensive and may be impracticable for largescale analysis (55).

#### 1.4.2.2 Beta tubulin gene

Beta tubulin is a monomeric globular protein involved in the generation of microfilaments. The locus includes some introns which are known to be good estimators for distinction of closely related species (17). BT2 protein-encoding gene has been broadly used in fungal phylogenetic analyses because it contains both variable and highly conserved regions and it can provide high resolution and support for fungal systematics. It is known that most *Trichophyton* spp., especially the human-adapted species, are similar to each other in ITS (17)(2).

#### 1.4.2.3 Tef-1 $\alpha$

The nucleotide sequence of translation elongation factor 1- $\alpha$  (*Tef-1 $\alpha$* ) gene encoding a part of the protein translation machinery was first used in *Fusarium*. The gene appears to be consistently single-copy and shows a high level of sequence polymorphism among related species (56)(57).

Due to this, this study aims to investigate if it is possible to identify and distinguish these species phylogenetically, *T. mentagrophytes* and *T. interdigitale*, *T. violaceum* and *T. soudanense*, by sequencing and comparing three parts of the fungal genome such as internal transcribed spacer (ITS), beta-tubulin gene (BT2) and the translation elongation factor 1- $\alpha$  (*Tef-1 $\alpha$* ) gene.

## 2. Objectives

This investigation work was developed in the CHU de Liège, *Le Centre hospitalier universitaire*, in the microbiology department, as it was an Erasmus+ Placement project.

The search of methods to identify dermatophytes has been studied for many years, and although some researchers have found some reliable techniques, some species of dermatophytes are continually misdiagnosed and misidentified.

The use of ITS, BT2 and Tef-1 $\alpha$  have been described by several authors as promising genes that are capable of identifying fungus to the species level, although they are not always successful.

The aim of this project is to combine these three genes in order to establish a method that would be able to improve the identification of these species as well as to improve the knowledge in their taxonomy and phylogeny.

To pursue this goal some objectives were established: Extraction and purification of fungus DNA, amplification of DNA by PCR technique for the three genes and sequence of the amplified DNA.

### 3. Materials and Methods

#### 3.1 Strains

We worked with 65 different strains that had been isolated in culture at the CHU of Liège from samples collected of infected hair from patients (15 had been previously classified as *T. interdigitale*, 14 as *T. mentagrophytes*, 13 as *T. violaceum* and 23 as *T. soudanense*). These strains were conserved frozen in the laboratory at -78°C.

Reference strains (IHEM) were also included in this study, IHEM 620 and IHEM 584 as reference strains of *T. interdigitale*, IHEM 10342, IHEM 4268, IHEM 4203 as reference strains of *T. mentagrophytes* and IHEM 13492 as reference strain of *T. soudanense*.

#### 3.2 Culture Conditions

The dermatophytes were cultured in liquid medium and the medium of choice was Sabouraud, prepared in the laboratory with 30 g of Sabouraud powder (Sigma) and 1 litre of distilled water.

Sabouraud's agar containing antibiotic(s) (chloramphenicol ± gentamicine) and cycloheximide (Actidione) is commonly used as primary isolation medium, and it is the reference medium to culture dermatophytes (58).

Cultures are usually incubated at 20–25°C, but higher incubation temperatures of 30–32°C can be used when lesions are suspected to be caused by some species (37).

The procedure consists in 15 mL of medium applied inside a falcon tube and one or two drops of milk containing the strain put after in the tube. Then the tubes are left in a stove at 30°C for approximately a week.

We also prepared solid cultures, and the medium used was Sabouraud plus chloramphenicol in a glass tube. The strains were applied with a inoculation loop and left in the stove at 30°C for approximately a week. (58).

It is important to mention that the tubes were not completely closed because the dermatophytes need oxygen to grow.

#### 3.3 DNA Extraction

A common protocol for DNA extraction involves two principal steps: first, the breakdown of cell walls that is generally carried out by mechanical disruption with bead-beating material, enzymatic digestion or homogenization with liquid nitrogen, and second, the isolation and purification of DNA. Frequently, filamentous fungi DNA is extracted by conventional methods (i.e., disrupt the cell wall and nuclear membrane, removing contaminant proteins, and resuspension in buffered solution), nevertheless, the DNA integrity and purity are regularly compromised, even more, loss of DNA yield on purification step can occur (59).

It was used bead beating material and several buffers, one of them being proteinase K, an enzyme that catalyze fungal cell lysis and removes the proteins (60).

The DNA extraction from the culture was performed with liquid medium where the material to extract was introduced in a 2 mL Eppendorf tube with small glass beads and 1 mL of distilled water.

Every time that an extraction is performed, is mandatory that a negative control is introduced (an Eppendorf with distilled water) to guarantee the absence of contamination.

The tubes are vortexed for 30 minutes, centrifuged for 10 minutes at 16,100 rpm. The supernatant is withdrawn, and it is added of 200  $\mu$ L of AL buffer (Qiagen), 180  $\mu$ L of ATL buffer (Qiagen), and 20  $\mu$ L of proteinase K (Qiagen).

Finally, the mixture is incubated in an inoculation plate for 2h at the temperature of 56°C.

This procedure joins a mechanical lysis with an enzymatic lysis, which is very important to guarantee that the cell wall is broken so that we can access the genetic material.

### 3.3.1 Maxwell Procedure

The Maxwell 16 Instrument makes use of paramagnetic particles to capture DNA following cell lysis. After cell lysis occurs, the particles are introduced to the samples to bind the DNA.

Following a series of sequential washes, the target DNA is eluted into a storage buffer suitable for downstream amplification applications.

Because the paramagnetic particles exhibit a maximum binding capacity, by standardizing the number of particles employed for extraction of the various samples

one can expect the amount of DNA eluted during the final step to be fairly consistent between samples. The instrument bases sample transfer on magnetic handling, problems normally associated with clogged tips, partial liquid transfers, rotational mixing, and maintenance of consumables are not an issue when using this system.

Magnetic handlers are inserted into disposable plunger mechanisms that are used for a single sample throughout the purification process, which minimizes the risk of sample-to-sample contamination (61).

We used Maxwell (Promega) machine and the Cell DNA Purification Kit (Promega). Magnetic handlers are inserted into disposable plunger mechanisms that are used for a single sample throughout the purification process, which minimizes the risk of sample-to-sample contamination. The DNA IQ Reference Sample Kit comes with cartridges that are sealed to contain pre-loaded aliquots of purification solutions (Figure 2). It contains a lysis buffer, DNA IQ Resin, and a wash buffer.

We applied:

1. 400  $\mu$ L of the samples in the first well;
2. A plunger in the last well which serves to sheath the magnetic poles during processing;
3. 300  $\mu$ L of elution buffer in the elution tubes.

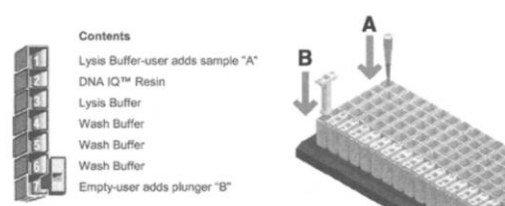


Figure 2: Diagram of the DNA IQ Reference Sample Kit/Maxwell 16 Instrument(61).

The procedure takes 35 minutes and then the DNA withdrawn (approximately 200  $\mu$ L) is ready to amplify.

### 3.4 DNA Amplification

#### 3.4.1 PCR

The PCR of ITS, Tef-1 $\alpha$  and BT2 were performed in a Thermo Cycler Hybaid using:

1. 10  $\mu$ L of the DNA sample
2. 40  $\mu$ L of a mix that contains:
  - a. 5  $\mu$ L of buffer II 10X (AB)
  - b. 7  $\mu$ L of MgCl<sub>2</sub> (25mM, from AB)
  - c. 0.4  $\mu$ L of dNTP (25 mM, from Promega)
  - d. 0.5  $\mu$ L of each primer

- e. 0.25 µL of Taq polymerase (5U/ µL, from AB)
- f. 26.35 µL of distilled water (Braun).

A positive control is used to check if there the procedure occurs normally and a negative control to guarantee that there are not any contaminants in the samples.

The primers used for ITS were ITS1 5' TCCGTAGGTGAACCTGCGG 3' and ITS4 5' TCCTCCGCTTATTGATATGC 3', for BT2 gene were Bt2a 5' GGTAACCAAATCGGTGCTGCTTTC 3' and Bt2b 5' ACCCTCAGTGTAGTGACCCTTGGC 3' and for Tef 1-αF 5' CACATTA ACTTGGTCGTTATCG 3' and Tef 1-αR 5' CATCCTTGGAGATACCAGC 3', as it is shown in Table 1 and the programs of PCR applied differed between genes, as it can be seen in Table 2, Table 3 and Table 4.

Primers	Foward	Reverse
ITS (IDT)	ITS 1: 5' TCCGTAGGTGAACCTGCGG 3'	ITS 4 5' TCCTCCGCTTATTGATATGC 3'
BT2 (IDT)	Bt2a: 5' GGTAACCAAATCGGTGCTGCTTTC 3'	Bt2b: 5' ACCCTCAGTGTAGTGACCCTTGGC 3'
Tef 1-α (IDT)	5' CACATTA ACTTGGTCGTTATCG 3'	5' CATCCTTGGAGATACCAGC 3'

Table 1: Primers of ITS, BT2 and Tef-1α used to amplify the dermatophytes DNA.

The following programs are applied:

#### ITS Program

Temperature	Time	Cycles
94° C	5 min	x1
94°C	15 sec	x35
55°C	5 sec	
68°C	40 sec	
68 °C	7 min	x1
4°C	infini	

Table 2: ITS program of PCR technique.

#### Tef -1α Program

Temperature	Time	Cycles
94° C	1 min	x1
94°C	1 min	x35
65°C	5 sec	
72 °C	1 min	
72 °C	7 min	x1
4°C	infini	

Table 3: Tef -1α program of PCR technique.

### BT2 Program

Temperature	Time	Cycles
94° C	5 min	x1
94°C	15 sec	x35
58°C	5 sec	
72°C	1 min	
72 °C	7 min	x1
4°C	infinite	

Table 4: BT2 program of PCR technique.

After PCR is done, the amplified products are revealed in an agarose 2% gel, in a E-Gel power Snap (Invitrogen) and the procedure consists in applying 10 µL of distilled water in each well, 10 µL of the 100 bp marker in the first well, 10 µL of the samples on the other wells and 10 µL of distilled water in every well. After 10 minutes, while the gel is running, the bands will get separated by size and will appear by applying an UV light because the gel is pigmented and it will bind with DNA.

### 3.5 Sequence Method

To obtain the sequence of each strain the following steps have to be accomplished:

1. Purification of the PCR products by ExoSap-IT technique
2. Sequence of the DNA fragments previously purified
3. Purification of the sequencing reaction

#### 3.5.1 Purification of the PCR products

A mix of 1 µL of ExoSapIT pure solution and 5 µL of Nuclease Free Promega water is done and 6 µL of it is put in the 96 well plate along with 6 µL of the samples.

The ExoSap programme is applied for 15 minutes at 37°C and then 15 minutes at 80°C.

#### 3.5.2 Sequencing Reaction

To initiate the sequencing procedure the samples were added to the mixture seen in Table 5, and then the tubes are centrifuged and the sequence program, shown in table 6 is applied and the DNA fragments are sequenced.

	Purification at ExoSapIT
Big Dye Termi	0.5 $\mu$ L
Buffer Big Dye 5x	2 $\mu$ L
Primer (3.2 $\mu$ M)	0.5 $\mu$ L
Samples to be sequenced	4 $\mu$ L (8 ng)
H <sub>2</sub> O HPLC	3 $\mu$ L
Total	10 $\mu$ L

Table 5: Reagents and their amounts used in the sequencing reaction.

Temperature	Time	Cycles
96°C	3 min	x1
96°C	15 sec	x25
50°C	15 sec	
60°C	4 min	
10°C	infinity	

Table 6: Description of the Program applied to sequence the dermatophytes DNA.

### 3.5.3 Purification of the sequencing reaction

The purification of the sequencing reaction is done by the CleanSeq Agencourt Technique, with the Kit CleanSeq Agencourt Ref. A29151 (800 rxn) A29154 (5000 rxn).

Finally the sequence is analysed by CBS database or BLAST database in Tef case (annexes).

### 3.6 Phylogenetic Analysis

Samples of interest were sequenced for the following three genes: ITS, Tef-1 $\alpha$  and BT2.

The following two species were chosen as outgroups: *Purpureocilium lilacinum* and *Aspergillus fumigatus*.

The sequences for the three genes of interest for each one of the two outgroups species were retrieved from Genbank.

Namely the accession numbers for *Purpureocilium lilacinum* sequences are: KJ476413.1 (Tef-1 $\alpha$ ), MH613756.1 (BT2) and LC413751.1 (ITS); the ones for *Aspergillus fumigatus* are: KJ476410.1 (Tef-1 $\alpha$ ), KU714964.1 (BT2) and AJ853744.1 (ITS).

For each one of the three genes, sequences from all samples and from the two outgroups were grouped.

Sequences were complemented when needed to correct the Sanger sequence and allow for alignment.

Alignments were performed using MUSCLE in Seaview (<https://www.ncbi.nlm.nih.gov/pubmed/19854763>) for each gene. The alignments for each of the three genes were then concatenated together based on the name of the sample and gaps were added between genes.

Phylogenies were then inferred on the concatenated alignment using PhyML (<https://www.ncbi.nlm.nih.gov/pubmed/20525638>).

PhyML was launched with a GTR model with aLRT branch support, optimized nucleotide equilibrium frequencies, optimized invariable sites and optimized across site rate variation. Tree search operations were performed using the best of NNI and SPR.

## 4. Results

### 4.1 Classification of the strains Classification of Strains by Sequencing method and later analysis in CBS and BLAST database

All the strains were grown in Sabouraud medium and DNA was amplified from all strains using PCR technique for all the three genes, Tef-1 $\alpha$ , ITS and BT2, with the exception of 5 strains that the PCR was negative when examined in the electrophoresis gel, perhaps because of an error during in the extraction.

The DNA was sequenced, and the results were analysed by CBS database, concerning ITS and BT2 genes, and BLAST database concerning Tef-1 $\alpha$ .

As we can see in Table 7, 13 of the species analysed were classified as *T. interdigitale*, where two of them were reference strains, IHEM 620 and IHEM 584.

<i>T. interdigitale</i>	170824-0008 170428-0054 170410-0060 170314-0069 171026-0006 171026-0004 171025-0081 171026-0007 171026-0009 171026-0010 180925-0065 IHEM 620 IHEM 584
-------------------------	---

Table 7: Discrimination of species of *T. interdigitale* sequenced and analysed by CBS and BLAST databases.

The strains identified as *T. mentagrophytes* (Table 8) were 14 in total in which 3 were reference strains, IHEM 10342, IHEM 4268 and IHEM 4203.

<i>T. mentagrophytes</i>	180814-0029
	180730-0023
	180604-0007
	180209-0032
	180925-0031
	190129-0017
	IHEM 10342
	IHEM 4268
	IHEM 4203
	190220-0076
	190226-0091
	190315-0029
	190313-0069
	161208-0065

Table 8: Discrimination of species *T. mentagrophytes* sequenced and analysed by CBS and BLAST databases.

Ten strains were identified as *T. violaceum* and are presented in Table 9. For each species, at least one reference strain was included in the study except for *T. violaceum*, because although this strain was a part of the research, it was not possible to extract the DNA, probably due to not enough time of growth in culture.

Besides this strain, other 3 were contaminated so after a second analysis we excluded them from the study.

<i>T. violaceum</i>	180227-0044
	180227-0045
	180227-0072
	180410-0017
	180410-0021
	180420-0056
	180611-0016
	180611-0049
	180621-0047
	180625-0012

Table 9: Discrimination of species of *T. violaceum* sequenced and analysed by CBS and BLAST databases.

Of all the 65 strains analysed, 19 were classified as *T. soudanense* (Table 10), where one is the reference strain, IHEM 13492.

<i>T. soudanense</i>	180227-0053
	180227-0070
	180227-0075
	180306-0068
	180410-0019
	180410-0022
	180410-0026
	180410-0027
	180410-0028
	180410-0033
	180410-0037
	IHEM 13492
	190118-0006
	190118-0005
	190118-0012
	181212-0075
	181212-0074
	180611-0017
	180611-0069

Table 10: Discrimination of species of *T. soudanense* sequenced and analysed by CBS and BLAST databases.

There was concordance on the results between the three segments analysed, which means that when sequencing every segment, ITS, BT2 and Tef-1 $\alpha$ , they all classified each strain as one species.

#### 4.2 Phylogenetic Analysis

After sequencing, the dendrograms were elaborated concerning *T. mentagrophytes*, *T. interdigitale*, *T. violaceum* and *T. soudanense* (Figure 3).

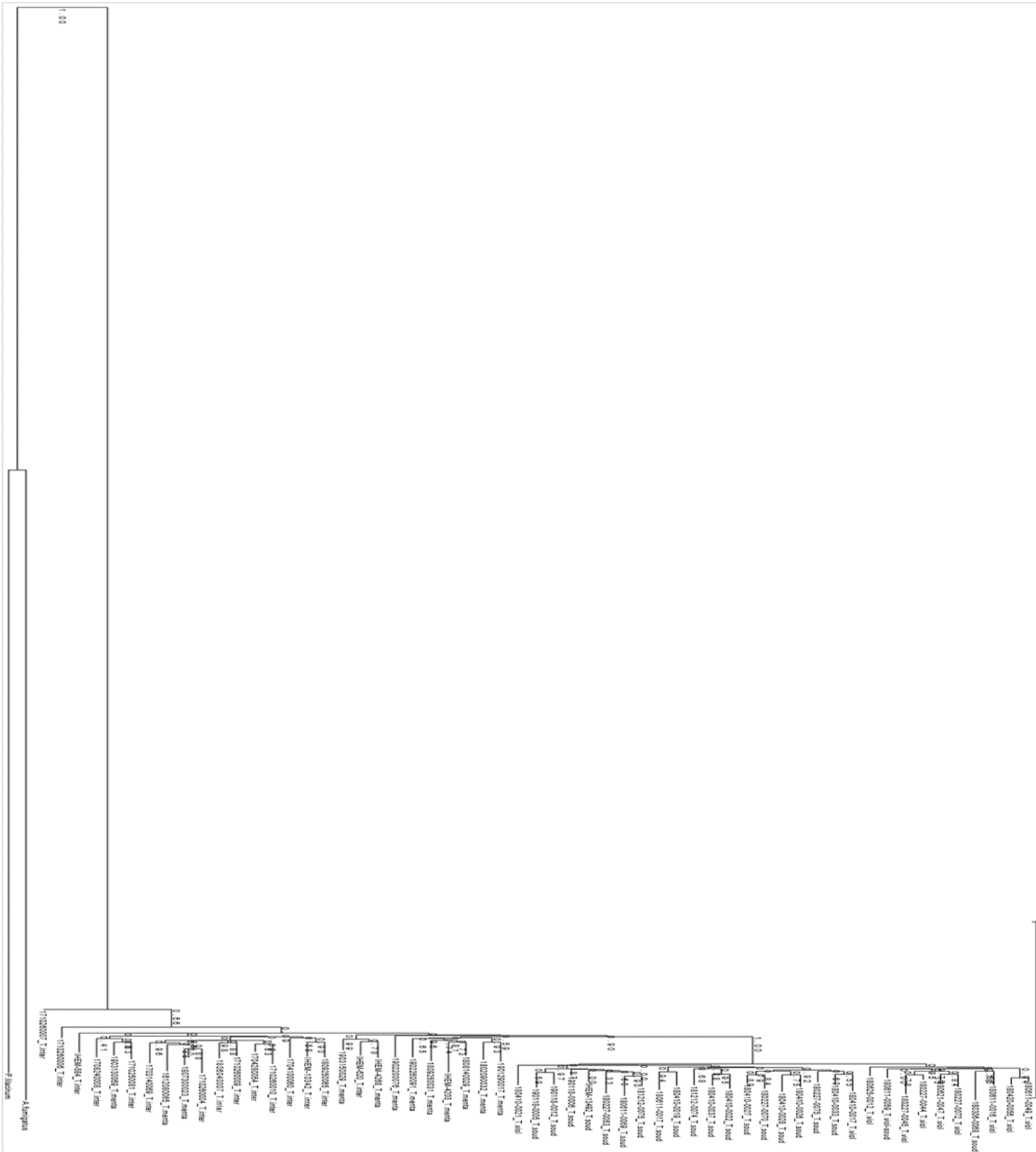


Figure 3: Dendrogram representing the phylogenetic differentiation of *T. mentagrophytes*, *T. interdigitale*, *T. soudanense*, and *T. violaceum*.

Firstly, *Purpureocilium lilacinum* from the class *Sordariomycetes*, and *Aspergillus fumigatus* from the class *Eurotiomycetidae* were used as outgroups, and they were chosen due to the lack of homology between them and the species that are being investigated.

It is necessary to include at least one distantly related sequence from the sequences being analysed in order to elaborate the dendrogram.

It can be seen in Fig. 4, there are clearly seen two clusters that separate the species of *T. violaceum* and *T. soudanense*, from *T. mentagrophytes* and *T. interdigitale*.

In the first cluster it is present a separation between *T. violaceum* and *T. soudanense*, and this cluster can be divided in two, of the two species, but in the *T. mentagrophytes* and *T. interdigitale* cluster the separation between species is more tenuous, being that we cannot determine the existence of two clusters that separate both species.

As it can be observed, some strains were not classified as they had been by CBS and BLAST platform. In the *T. mentagrophytes* dendrogram we can see that all the strains that were classified as this species are classified correctly but 2 strains that were well classified as *T. mentagrophytes*, appear in the dendrogram area of *T. interdigitale* (IHEM 4268 and 190313-0069), one of them being a reference strain.

On the other hand, all species that were previously classified as *T. interdigitale* were well evaluated and maintained their identification.

Analysing the *T. violaceum* dendrogram, all the strains were identified as they were by sequencing, although 2 strains were in *T. soudanense* dendrogram (180410-0017 and 180410-0021), and in the *T. soudanense* dendrogram the same happened, as they were all identified as previously but one strain (180306-0068) was in *T. violaceum* dendrogram.

## 5. Discussion

The overall increase of *Tinea capitis* during the last decades is due to the emerging anthropophilic infections in Europe probably as a result of increasing numbers of immigrants of different ethnic origin. (13)

Whatever the reasons behind the current outbreak, the procedures for surveillance are clearly not able to detect cases in order to control the spread of infection (14).

*Tinea capitis* does not respond to topical therapy alone, and therefore requires oral antifungal agents, which implies the need of the exact treatment regimen dependent on the species (38).

Worldwide *Tinea capitis* is most commonly caused by several dermatophytes, being that the aim of this study was to identify and distinguish some of them, *T. interdigitale* from *T. mentagrophytes* and *T. violaceum* from *T. soudanense*.

We used only a molecular method to identify the strains because the morphological properties of the strains are not always accurate to identify them with certainty, as they have been misidentified before (62), also it is hard to differentiate some based on conventional methods (26) and due to the time traditional methods take to develop, since that factor was limited.

### 5.1 Strains Identification

To identify each strain this study focused on ITS, BT2 gene and Tef-1 $\alpha$  which have been used before to discriminate fungal species (35)(63).

#### 5.1.1 ITS

The Internal transcribed spacer (Figure 4) is located in the rDNA gene complex of all eukaryotic cells between the 18S and 5.8S rDNA genes (ITS1) and the 5.8S and 28S rDNA genes (ITS2) (Figure 3) and has areas of high conservation and areas of high variability. It is an ideal starter for the development of specific PCR primers for identification of fungal species (68)(55).

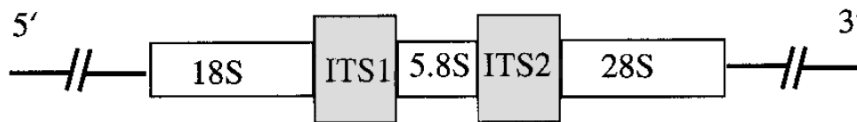


Figure 4: Representation of the rDNA gene complex in fungi denoting gene order and position of the ITS regions (Iwen et al., 2002).

Once isolated, the ITS regions can be compared to the wealth of other sequences in the sequence database.

Although the ITS region is the main target, other genes are becoming more widely studied, in particular the  $\beta$ -tubulin gene.

#### 5.1.2 $\beta$ -Tubulin gene

Microtubules are found in all eukaryotic cells and are involved in maintenance of cell shape, mitosis, and a variety of other morphogenic events. At the core of these multimeric structures, lie heterodimeric tubulin filaments made up of two very similar  $\alpha$ - and  $\beta$ -tubulin proteins. Despite the highly conserved nature of  $\alpha$ - and  $\beta$ -tubulins, sufficient differences exist between cell types and taxa to provide opportunities for identification based on these tubulin proteins (64).

The database of  $\beta$ -tubulin sequences is not as large as that for ribosomal ITS sequences but can be particularly useful when ITS sequence variation or conservation is not suitable for production of a taxon-specific diagnostic (65)(66).

#### 5.1.3 Tef-1a

Finally, Tef-1a gene, which encodes part of the protein translation machinery, has shown a high level of sequence polymorphism among related species and is recommended for the discrimination of fungal species (67).

### 5.2 Amplification and sequencing of DNA

PCR is the enzymatic exponential amplification of a specific target region using short primers, leading to detectable amounts of amplified DNA from one or a few original sequences (68).

Sequencing is seen as the gold standard method to identify species (69).

The Sanger sequencing method uses 2',3' dNTPs which lack a hydroxyl group on the 3' carbon of the sugar ring. In a regular nucleotide, the 3' hydroxyl group acts as a "hook," allowing a new nucleotide to be added to an existing chain.

Once a dideoxy nucleotide has been added to the chain, there is no hydroxyl available and no further nucleotides can be added. The chain ends with the dideoxy nucleotide, which is marked with a particular colour of dye depending on the base (A, T, C or G) it carries.

Dermatophyte species identification by sequence comparison is often problematic using the publicly available NCBI database. It is plethoric with identical sequences under different names (especially ITS and 28S sequences).

A way to circumvent this problem is to directly use the publicly available ITS sequence database at the CBS dermatophyte database website. Identification of fungi in dermatological samples using PCR is reliable and provides significantly improved results in comparison with cultures (32).

As our results show, 65 strains were analysed and with the combination of the three genes it was achieved an identification by DNA sequencing and comparison with CBS database and BLAST database.

### 5.3 Phylogenetic analysis

It could be inferred this method as good approach to evaluate and distinguish dermatophytes, however, after making a phylogenetic study with these three genes the results were not satisfactory due to lack of separation between species.

This can be explained because they are very closed related, and they have been misidentified before, or perhaps because the targeted genes were not ideal to separate these specific species. Some authors wrote that the variations found in ITS analysis were very slight suggesting that these differences are not useful markers for strain identification (32) (3) and there are some studies that still consider *T. interdigitale* a subtype of *T. mentagrophytes*, and see them as only one specie.

It has also been written that *T. soudanense* and *T. violaceum* had also been recognised as a synonym before, but the unification of these species may conceal a possible evolutionary diversification since both species have their unique geographical distribution (3)(1) (70)(23).

## **6. Conclusion**

In conclusion, it was possible to discriminate the different species of dermatophytes by the sequencing method but the phylogenetic analysis performed did not have the expected results, because the species that we were trying to distinguish are very close related, and are a lot of times misidentified.

To sum up, this project helped understand the differences and difficulties in discriminating dermatophytes and also the importance of its identification being that more research has to be done to achieve a more reliable method.

## **7. Future perspectives**

Firstly, since this project lacked the morphologic evaluation and research, this analysis should be performed in order to sustain the identification reached with the molecular studies, since although the results with the traditional methods take longer, and have some disadvantages as it was said before, they still are very important to discriminate dermatophytes.

Secondly, being that the genes amplified have been investigated before, and were successful on identifying several species our focus should be placed on different types of techniques.

There are several types of molecular techniques and procedures that have been used before to identify dermatophytes, among them, RT PCR, nested PCR and PCR- RFLP, which could all be used as an alternative to the technique performed in this study.

Given the advantages and performance, a nested PCR could be performed to the samples analysed in this study, to search if the results obtained would be more satisfactory.

## 8. Bibliography

1. Mirhendi H, Motamedi M, Makimura K, Satoh K. Development a diagnostic pan-dermatophyte TaqMan probe real-time PCR assay based on beta tubulin gene. 2016;520–7.
2. Abastabar M, Mirhendi H, Rezaei-matehkolaei A, Shidfar MR, Kordbacheh P, Makimura K. Restriction Analysis of  $\beta$  -Tubulin Gene for Differentiation of the Common Pathogenic Dermatophytes. 2014;96(December 2012):91–6.
3. Li HC, Bouchara J, Hsu MM, Barton R, Su S, Chang TC. Identification of dermatophytes by sequence analysis of the rRNA gene internal transcribed spacer regions. 2019;(2008):592–600.
4. Med J, Li R, Wang D, Academy C, Hospital TF. Typing of Common Amplification Dermatophytes of Polymorphic by Random. 1997;38:239–46.
5. Cafarchia C, Iatta R, Stefania M, Gräser Y, Otranto D. Infection , Genetics and Evolution Molecular epidemiology , phylogeny and evolution of dermatophytes. Infect Genet Evol [Internet]. 2013;20:336–51. Available from: <http://dx.doi.org/10.1016/j.meegid.2013.09.005>
6. Ahmadi B, Mirhendi H, Shidfar MR, Jalalizand N, Geramishoar M, Shokoohi GR. ORIGINAL ARTICLE / ARTICLE ORIGINAL A comparative study on morphological versus molecular identification of dermatophyte isolates. J Mycol Med [Internet]. 2015;25(1):29–35. Available from: <http://dx.doi.org/10.1016/j.mycmed.2014.10.022>
7. Hay RA. Letter to the Editor. 2016;83:247–50.
8. Laniosz V, Wetter DA. What's new in the treatment and diagnosis of dermatophytosis? 2014;33(September).
9. Tro A, Zie P, Gnat S, Nowakiewicz A. Evaluation of growth conditions and DNA extraction techniques used in the molecular analysis of dermatophytes. 2017;
10. Degreeef H. Clinical Forms of Dermatophytosis ( Ringworm Infection ). 2008;(May):257–65.
11. Elewski BE. Tinea capitis: A current perspective. 2000;1–20.
12. Higgins EM, Fuller LC. Guidelines for the management of tinea capitis. 2001;(January):53–8.
13. Ginter-hanselmayer G, Weger W, Ilkit M, Smolle J. Epidemiology of tinea capitis

- in Europe : current state and changing patterns. 2007;50:6–13.
14. Robles W, Midgley G. Tinea capitis in Europe : new perspective on an old problem. 2001;229–33.
  15. Gupta AK, Summerbell RC. Tinea capitis. 2000;(March):255–87.
  16. Makni F, Ayadi A. Polymorphisms in the ITS rDNA regions for differentiating strains of the Trichophyton mentagrophytes complex in Sfax-Tunisia. 2014;453–9.
  17. Rezaei-matehkolaei A, Mirhendi H, Makimura K, Hoog GS De, Satoh K, Najafzadeh MJ, et al. Nucleotide sequence analysis of beta tubulin gene in a wide range of dermatophytes. 2014;(July):674–88.
  18. Liu D, Coloe S, Baird R, Pedersen J. MYCOLOGY PCR identification of Trichophyton mentagrophytes dermatophytes with a random primer. 2019;46(1997):1043–6.
  19. Fathallah A. Relationship Between Phenotypic and Genotypic Characteristics of Trichophyton mentagrophytes Strains Isolated from Patients with Dermatophytosis. 2017;487–93.
  20. Chauvin MFDE. Genetic diversity among Trichophyton mentagrophytes isolates using random amplified polymorphic DNA method. 1999;839–44.
  21. Michizuki, Takashi; Kawasaki, Masako; Ishizaki, Hiroshi; Makimura K. Identification of Several Clinical Isolates of Dermatophytes Based on the Nucleotide Sequence of Internal Transcribed Spacer 1 (ITS 1) in Nuclear Ribosomal DNA. 1999. p. Vol. 26: 276-281.
  22. Makimura K, Mochizuki T, Hasegawa A, Uchida K, Saito H, Yamaguchi H. Phylogenetic Classification of Trichophyton mentagrophytes Complex Strains Based on DNA Sequences of Nuclear Ribosomal Internal Transcribed Spacer 1 Regions. 1998;36(9):2629–33.
  23. Magill SS, Manfredi L, Swiderski A, Cohen B, Merz WG. in Baltimore , Maryland □. 2007;45(2):461–5.
  24. Summerbell RC, Haugland RA, Li A. rRNA Gene Internal Transcribed Spacer 1 and 2 Sequences of Asexual , Anthropophilic Dermatophytes Related to Trichophyton rubrum. 1999;37(12):4005–11.
  25. Zomorodian K, Uthman U, Tarazooie B. The effect of griseofulvin on the gene regulation of  $\beta$ -tubulin in the dermatophyte pathogen Trichophyton rubrum. J

- Infect Chemother [Internet]. 2007;13(6):373–9. Available from:  
<http://dx.doi.org/10.1007/s10156-007-0552-5>
26. Ilkit M, Durdu M. Critical Reviews in Microbiology Tinea pedis : The etiology and global epidemiology of a common fungal infection Tinea pedis : The etiology and global epidemiology of a common fungal infection. 2015;7828.
  27. Didehdar M, Khansarinejad B, Amirrajab N, Shokohi T. Development of a high-resolution melting analysis assay for rapid and high-throughput identification of clinically important dermatophyte species. 2016;442–9.
  28. Motamedi M, Mirhendi H, Zomorodian K, Khodadadi H, Kharazi M, Ghasemi Z, et al. Clinical evaluation of  $\beta$  - - time PCR for rapid diagnosis of dermatophytosis , a comparison with mycological methods. 2017;(May):692–6.
  29. Yazdanparast A, Jackson CJ, Barton RC, Evans EG V. Clinical and Laboratory Investigations Molecular strain typing of *Trichophyton rubrum* indicates multiple strain involvement in onychomycosis. 2003;51–4.
  30. Howell SA, Barnard RJ, Humphreyst F. Application of molecular typing methods to dermatophyte species that cause skin and nail infections. 2019;48(April 1997):0–7.
  31. Elavarashi E, Kindo AJ, Kalyani J. Optimization of PCR – RFLP Directly from the Skin and Nails in Cases of Dermatophy- tosis , Targeting the ITS and the 18S Ribosomal DNA Regions. 2013;7(4):646–51.
  32. Verrier J, Monod M. Diagnosis of Dermatophytosis Using Molecular Biology. *Mycopathologia*. 2017;182(1):193–202.
  33. Abdel-rahman SM. Strain Differentiation of Dermatophytes. 2008;(October 2007):319–33.
  34. Article O. Use of Single-enzyme PCR-restriction Digestion Barcode Target- ing the Internal Transcribed Spacers ( ITS rDNA ) to Identify Dermatophyte Species. 2012;41(3):82–94.
  35. Rezaei-matehkolaei ALI, Makimura K, Hoog GSDE, Shidfar MR. Discrimination of *Trichophyton tonsurans* and *Trichophyton equinum* by PCR-RFLP and by  $\beta$  - tubulin and Translation Elongation Factor 1-  $\alpha$  sequencing. 2012;(October):760–4.
  36. Gräser Y, Czaika V, Ohst T. Diagnostic PCR of dermatophytes – an overview. 2012;2012(Band 10):721–5.

37. Robert R, Pihet M. Conventional methods for the diagnosis of dermatophytosis. *Mycopathologia*. 2008;166(5–6):295–306.
38. Wiegand C, Bauer A, Brasch J, Nenoff P, Schaller M, Mayser P, et al. Sind die klassischen Methoden zur mykologischen Diagnostik noch State-of-the-Art? *JDDG - J Ger Soc Dermatology*. 2016;14(5):490–4.
39. Vishnu S, Tarun KK, Anima S, Ruchi S, Subhash C. Dermatophytes: Diagnosis of dermatophytosis and its treatment. *African J Microbiol Res*. 2015;9(19):1286–93.
40. Pryce TM, Palladino S, Kay ID, Coombs GW. Rapid identification of fungi by sequencing the ITS1 and ITS2 regions using an automated capillary electrophoresis system. 2003;(October).
41. Heidemann S, Monod M, Gra Y. Signature polymorphisms in the internal transcribed spacer region relevant for the differentiation of zoophilic and anthropophilic strains of *Trichophyton interdigitale* and other species of *T. mentagrophytes sensu lato*. 2010;(i):282–95.
42. Garg J, Tilak R, Garg A, Prakash P, Gulati AK. Rapid detection of dermatophytes from skin and hair. 2009;6.
43. Liu D, Coloe S, Baird R, Pedersen J. Application of PCR to the identification of dermatophyte fungi. 2019;49(2000):493–7.
44. Jackson CJ. Molecular Identification Dermatophyte and Strain Fungi Typing of. 2001;42:7–10.
45. Andriessse GI, Wintermans RGF, Bergmans AMC, Ent M Van Der, Klaassen A, Bo N, et al. Evaluation of a single-tube real-time PCR for detection and identification of 11 dermatophyte species in clinical material. 2009;
46. Emam SM, El-salam OHA. Alexandria University Faculty of Medicine Real-time PCR : A rapid and sensitive method for diagnosis of dermatophyte induced onychomycosis , a comparative study. *Alexandria J Med [Internet]*. 2016;52(1):83–90. Available from: <http://dx.doi.org/10.1016/j.ajme.2015.05.001>
47. Arabatzis M, Bruijnesteijn Van Coppenraet LES, Kuijper EJ, De Hoog GS, Lavrijsen APM, Templeton K, et al. Diagnosis of common dermatophyte infections by a novel multiplex real-time polymerase chain reaction detection/identification scheme. *Br J Dermatol*. 2007;157(4):681–9.
48. Garg J, Tilak R, Garg A, Prakash P, Gulati AK, Nath G. Rapid detection of

- dermatophytes from skin and hair. *BMC Res Notes*. 2009;2.
49. Mohammadi R, Abastabar M, Mirhendi H, Badali H, Shadzi S. Use of Restriction Fragment Length Polymorphism to Rapidly Identify Dermatophyte Species Related to Dermatophytosis. 2015;8(6):4–9.
  50. Kardjeva V, Summerbell R, Kantardjiev T, Devliotou-Panagiotidou D, Sotiriou E, Gräser Y. Forty-eight-hour diagnosis of onychomycosis with subtyping of *Trichophyton rubrum* strains. *J Clin Microbiol*. 2006;44(4):1419–27.
  51. Verrier J, Krähenbühl L, Bontems O, Fratti M, Salamin K, Monod M. Dermatophyte identification in skin and hair samples using a simple and reliable nested polymerase chain reaction assay. *Br J Dermatol*. 2013;168(2):295–301.
  52. Yoshida E, Makimura K, Mirhendi H. Rapid identification of *Trichophyton tonsurans* by specific PCR based on DNA sequences of nuclear ribosomal internal transcribed spacer ( ITS ) 1 region. 2006;
  53. Schoch CL, Seifert KA, Huhndorf S, Robert V, Spouge JL, Levesque CA. Nuclear ribosomal internal transcribed spacer ( ITS ) region as a universal DNA barcode marker for Fungi. 2012;109(16):6241–6.
  54. Fari MEL, Vilgalys R, Gra Y. Phylogeny and taxonomy of the family Arthrodermataceae ( dermatophytes ) using sequence analysis of the ribosomal ITS region. 1999;(October 1998):105–14.
  55. Iwen PC, Hinrichs SH, Rupp ME. Utilization of the internal transcribed spacer regions as molecular targets to detect and identify human fungal. 2002;(July 2001):87–109.
  56. Mirhendi H, Makimura K, Hoog GS De, Rezaei-matehkolaei A, Najafzadeh MJ, Umeda Y, et al. Translation elongation factor 1-  $\alpha$  gene as a potential taxonomic and identification marker in dermatophytes. 2015;(December 2014):215–24.
  57. ã TH, Watson IJ, Young JPW. Phylogeny of the Glomerales and Diversisporales ( Fungi : Glomeromycota ) from actin and elongation factor 1-alpha sequences. 2003;229.
  58. Chabasse D, Pihet M. Méthodes de diagnostic d ' une. *J Mycol Med [Internet]*. 2014;24(4):269–78. Available from: <http://dx.doi.org/10.1016/j.mycmed.2014.10.006>
  59. G SM, Y AG, C AH, Adrien G. Two e ffi cient methods for isolation of high-quality genomic DNA from entomopathogenic fungi. 2018;148(December 2017):55–63.

60. Mahadevan C, Mugunthan M. ScienceDirect Evaluation of three DNA extraction methods from fungal cultures. *Med J Armed Forces India* [Internet]. 2018;74(4):333–6. Available from: <http://dx.doi.org/10.1016/j.mjafi.2017.07.009>
61. Krnajski Z, Geering S, Steadman S. Performance verification of the Maxwell 16 Instrument and DNA IQ Reference Sample Kit for automated DNA extraction of known reference samples. 2007;264–9.
62. Mochizuki T, Takeda K, Á DÁM. Molecular Markers Useful for Intraspecies Subtyping and Strain Differentiation of Dermatophytes. 2017;57–65.
63. Iwen PC, Hinrichs SH. Utilization of the internal transcribed spacer regions as molecular targets to detect and identify human fungal. 2002;(July 2001):87–109.
64. Hollomon DW, Butters JA, Barker H, Hall L. Fungal  $\beta$ -tubulin, expressed as a fusion protein, binds benzimidazole and phenylcarbamate fungicides. *Antimicrob Agents Chemother*. 1998;42(9):2171–3.
65. McCartney HA, Foster SJ, Fraaije BA, Ward E. Molecular diagnostics for fungal plant pathogens. *Pest Manag Sci*. 2003;59(2):129–42.
66. Ping YY, Zhong S, Li W, Huang JWW, Fan Y. Kerion and Tinea Corporis Caused by Rabbit-Derived *Trichophyton interdigitale* in Three Siblings and One Consulting Doctor Using  $\beta$ -Tubulin Gene to Identify the Pathogen. *Mycopathologia*. 2016;
67. Nouripour-sisakht S, Ahmadi B, Makimura K, Hoog S De, Umeda Y. Characterization of the translation elongation factor 1- a gene in a wide range of pathogenic *Aspergillus* species. 2017;419–29.
68. Atkins SD, Clark IM. Fungal molecular diagnostics: A mini review. *J Appl Genet*. 2004;45(1):3–15.
69. Haghani I, Shams-ghahfarokhi M, Asl AD, Hedayati MT, Modares T, Fungi I, et al. Molecular identification and antifungal susceptibility of clinical fungal isolates from onychomycosis ( uncommon and emerging species). :0–3.
70. Kong F, Tong Z, Chen X, Sorrell T, Wang B, Wu Q, et al. Rapid Identification and Differentiation of *Trichophyton* Species , Based on Sequence Polymorphisms of the Ribosomal Internal Transcribed Spacer Regions , by Rolling-Circle Amplification □. 2008;46(4):1192–9.

Table 11: Results of ITS sequencing in *T. interdigitale* and *T. mentagrophytes*

Number	Sequence	ID
170824000 8	GGGGTTTCGCGCAGCCGGAGGCTGGCCCCACGATAGGGCCAAACGTC CGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGTC TACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCGT TCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCCGGA GGACAGACGCAAAAAAATTCTTTTCAAGAAGAGCTGTCAGTCTGAGCGTTA GCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGC ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG GGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGT GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC GCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAATG GGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA CTTAAGCATATCAATAAGCGGAGGAAGTGTGCCCCACCCAGCGGAAGC TGCCCCCAGGATGGGCAAAGTCCGGGGGGGTGACCCATTGCCCGCC GTCCACCCATTCTGTCGATTTCTCG	T. inter
170428005 4	CGGTTTTGCGGCGGAGGCCGGGAGGCTGGCCCCACGATAGGGCCAA ACGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTC TTGTCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAG CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCG CGGAGGACAGACGCAAAAAAATTCTTTTCAAGAAGAGCTGTCAGTCTGAGC GTTAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTC CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA GAATTCGTCGATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT TCCGGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCG GCTTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGG GACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGC GAATGGGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA AATCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCG CTGAACCTAAGCATATCAATAAGCGGAGGAATGTTTCCCCCGCGGCC GGAGGCTGGCCCCCGATGGCCAACCTTCGGTCCGGGTGAGCACATG TGCCCGCGGTACCCCCATTCTTGTGCAATTAAGTTCGGTTGCTCGGGGA CGCGCTCTCCAGGAGAGCGTTTGGCGACCTCCTTTAGGGGCTGAACCT GGAGCGCCGCCGAAGGATAATCAAAAAATCTTTCAAAACTGTCTTGAAG CGTTACAGTAA	T. inter
170410006 0	AGGTTTTCGCGGCGAGGCCGGAGCTGGCCCCACGATAGGGCCAAACGT CCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGT CTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCG TTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCCG AGGACAGACGCAAAAAAATTCTTTTCAAGAAGAGCTGTCAGTCTGAGCGTTA GCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGC ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG GGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGT GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC	T. inter

	<p>GCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGAATG  GGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT  GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA  CTTAAGCATATCAATAAGCCGGAGGAAAGGTCCCCCGCGAGGCCGGA  GGCTGGCCCCCGATGGGCAAAGGTCCGTCTGGGGTGAGCACATGTGG  CGGCGTACCGCCATTCTTGTCTACATTATCGGTTGCTCGGAGGGCGCG  CTCTCCAGAGAGCTTTCGGCAGCTCTCTTTTAGTGGCTAACGCTGGGAG  CGCGCGGAAGGAATACGAAAAAATTCTTTCGAGACTGTCGTGAGCGTT  TACAGCAGAATCATTTAACTTTACACGGATCTCTTGCTTCGGCATCATG  AAGAGCAGCGAATGCAATAGTATGTGAATGAGAATCGTGATACTCAATCA  TTAAGCATTGACCCGGGCGATCGGGGGAGAGCTGTCAGCCATTCTCCTC  ACCGCGGTGGTGTGATGAGACTCGCCGCGCTCTCGGTGGGAGACCGAA  CAGTGACAGCGCATTACGGCTTCTAGTGGCGATGTAACGGCGACTCTG  AAGCGCGCACGCGTAAATGCTTGAATCTTCAGTGGGATCCCATATACTA  CGC</p>	
<p>170314006 9</p>	<p>AGGGGTTTGCGGGCAGCCGGAGCTGGCCCCCACGATAGGGCCAAAC  GTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTT  GTCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGC  CGTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCC  GGAGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCG  TTAGCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGTTCC  GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG  AATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT  CCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCTCAAGCCCGGC  TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA  CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGA  ATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAA  TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCT  GAACTTAAGCATATCAATAAGGCGGAGGAAAGCGCCCCCCCCGAGGCC  GGACGCGGCCCCACGATGGGGCAAAGTCCGTCTGGTGTGAACCCAATG  TGGCGGCGTAACGCCATTCTGTTAATTCTCGTTTGCTCGAAGGCGCC  TCTCCAGCAAAACGTTGGGGAACCTCTTTATGGCTAACCGGGCGGGCG  CCAGAAGAATCACAAAAAATCTTTCAGACTGTGGTGGAAACAATAGAGA  GAAATTTTTAAAGTTCACACGGATTCTGGCTCCGCAAAATAAAAAACAG  GGAAGCAATAGGGAGGGGGGAAATGCTAAGC</p>	<p>T. inter</p>
<p>171026000 6</p>	<p>GGGGGCTTTGCGCGCAGCCGGAGCTGGCCCCCACGATAGGGCCAAA  CGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCT  TGTCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAG  CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGC  CGGAGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGC  GTTAGCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGTTCC  CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA  GAATTCGCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT  TCCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCTCAAGCCCGG  CTTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGG  ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCG  AATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA  ATCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGC  TGAATTAAGCATATCAATAAGGCGGAGGAAAGACATGCCCCCGCAGCG  GACCCGGCCCCACGATGGGCAACGTCGTAGGGGTGAGCAATGTGCGC  GGCGTACGCCATTCTGTCTAATACTCGGTGCTCGGCGGGCGCGCTCT  CCGGAAAGCCTTCGGGAGCTCTCTTTAGTGGCTAAACCTGGACCGCCC  GCCGAGGAAAACCAAAAAATTTTTCGAAGACTGTCGTCTGAGCGTTACA</p>	<p>T. inter</p>

	<p>GCAAATAATTTAAAATTTACACGGATCTCTGGGTTCGGCATCAAGAAA  AAGCAGCGAAGCGATAGTAAGTGAATGGAAGATCGTGAATATCAATTTG  AACACTATGCGCCGCGGCATCGGGGGGAGCGTGATCAAGGTTTTTCCC  CCCCGCTGCTGGGTAGAAAAACCCCGCCCCCTCTTGGGTGCGAGAAA  AGC</p>	
<p>171026000 4</p>	<p>GGGTTGGCGCGCAGACGGAGCTGGCCCCCACGATAGGGCCAAACG  TCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTG  TCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCC  GTTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCCG  GAGGACAGACGCAAAAAAATCTTTTCAAGAAGAGCTGTCAGTCTGAGCGT  TAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCG  GCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGA  ATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT  CGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCT  TGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGAC  GCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAA  TGGGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAT  CTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTG  AACTTAAGCATATCAATAAGCCGGAGGAAAGGGGCCCCCGCGAGGCG  GACGCCGGCCCCACGATAGGGCAAAGTTCGTCGGGGTGAACACATTG  GCGGCGTACGCCATTCTGTCTACATTACTCGTTGCTCGGCGGGCGGCT  CTCCAGGACGCGTTTGGGATCTCTTTACTGCTAACCCGGAGGCCGCG  GAGAAATAGCAAAAAAATCTTTTCAACACTGTCGTCGAGGTTGCAGCAA  AATAGTTAAATTTTACACGGATCTCTTGGATTGGCATCATAAGAGCAAGG  AATGCATAATGAATGAGAATTGCGAGTTAAATCCATCTGTAGCAATGCGC  GGATTTCGGGAGAAAGCAGTGAGCCCTTTTCAACGGGCGCCGTGTAGA  ACTCGGCGCCTCTGGGGTGAAGGAAAGCGAAAAAAGCGACCATTGCT  CTGGCAATGCAAAACGGCTGAAGGCAGGTCATATCTCGTTTCAAGAGTCTC  ACTGCAGGGGAGACGTCACCTATGCATCACGAG</p>	<p>T. inter</p>
<p>171025008 1</p>	<p>CGGGTTTGCGCGCAGCCGGAGCTGGCCCCCACGATAGGGCCAAACGT  CCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGT  CTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCG  TTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCGG  AGGACAGACGCAAAAAAATCTTTTCAAGAAGAGCTGTCAGTCTGAGCGTTA  GCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGC  ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT  CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG  GGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGT  GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC  GCCCCAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAATG  GGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT  GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA  CTTAAGCATATCAATAAGGCGGAGGAAAGGGGGCCCCCCCCCAAGCCG  CAACTGGCCCCCAGATGGGGCCAAAGTCCGTCAGGGGTGACACATGTG  GCGGCCTACGCCATTCTTGTCTACATTACACGGTGCCTCGGCGGGCG  CGCTCTCCAGATATCGTTGGGATCTCTTTGTGGCTCACGCGGGACGC  CCCCGGAGAATCAAAAAATTTTAAATAGCGGTGTCTGACCTAGACA  GCGAAATAGTTTAACTTTACACGGATTCTTGGTCCGCTAATAAGAAACA  GCGAATGGATAAATAAGGTGAAATGACTGATGCTTTATCTCTATCTGAAA  CAATGCGCTCGGGATTCCGGGGAGAAAGCCATTGAGCCCTTTTCCAAC  CGCTGTCCGGAGTGAAGACCCCCCGCGCACCTTTTGGGAGAAAGAAAC  GCGCAAAAAATAAACAGCCATTTCGTTTCTGGGGGGATGGGAAAACCA  CGGATCGCACGACCACCGCCGCAACATGTTTTCCCGTGGATAGAGTA</p>	<p>T. inter</p>

	CTCTTACGATGTATGAGACGCTCTCATCTATTACTTAATTATCGGAGAAA GAAAAAAAAACAC	
171026000 7	AGGCTTGCGGGCAGCGGAGCTGGCCCCCACGATAGGGCCAAACGTCC GTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGTCT ACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAGCCGTT CGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCCGGAG GACAGACGCAAAAAAATTCTTTTCAAGAAGAGCTGTCAGTCTGAGCGTTAG CAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGCA TCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATTC CGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCGG GGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGTG TGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGCG CCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGAATGG GCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCTG TTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAAC TTAAGCATATCATAAGCCCCGGAGGAAGTTGGTCCCCCAGCCGGACGCC GGCCCCCACGATGGGGCAAACGTCGTCAGGGGTGAGCACATGTGCGC GGCCGTACGCCCATCTTGTCTGCATTCTCGGTTGCTCGGCGGCGCG CTCTCCCAGGACACCGTTCGCGAGCTCTCTGTGTGGCTAACGCGGGAG GCCCGCGGAGGACGACCAAAAATTCTTTCAAGACTGTCGTCTGAGCGT TACAGCAAAATCGTTTAACTTTACACGCGATCTCTGGTTCGCTCAAAG ACACGAAATAGATAAATATGTGGAATAATAAACTCAATTAATCTTAAGCC ATGACCCCGGCATTGGGGACAGCGGTTCAAGTATTCCCCTCTCCCGCTG TGTGATGAACATCGTCTGTTTTCGGGTTGCAGAAACTCGGAACATGCA GAGCCCGAATTCGCTCTAGCCAATGTCAACGGCTCTCGACGCCATGCC AAATTTTTGTCTGTATGAGTACTGCATAGATGAATCGCTAACTATAAGTGC GTTAATACCGGCGAGATAACAATCAATTCT	T. inter
171026000 9	GGGTTTGGCGCGCAGGACGGAGGCTGGCCCCCACGATAGGGCCAAA CGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCT TGTCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAG CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGC CGGAGGACAGACGCAAAAAAATTCTTTCAAGAAGAGCTGTCAGTCTGAGC GTTAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTC CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA GAATTCGCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT TCCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGG CTTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGG ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTTCTAGGCG AATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA ATCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGC TGA ACTTAAGCATATCAATAAGGCGGAGGAAAGTTAGTTGCGCCCAGGC GGGAGGCTGGCCCCCACGATGGGGCAACGTCCGTCAGGGTGTGACACAT GTGCCGGCCGTACCGCCCCCTTTCTTGTCTAATTAATCGTTGCTGGCGGG CCGCGCTCTCCCAGGAGACCGTTCGCGATCTCTCTTTTGTGGCTAACGC TGGAGCGCCGCGAGGAGGACCAAAAATCTTTCAAGACTGTCACTGAA GCTTAACAGCAAATAATTAATTTACACGCGATCTCTGGGTTCCGGCTCAA TAAAGAACCCCGAATGCGAAAGTAGGGGAATTGGAAATCCGCACTCTCT ATTTTGACACGATTGACCCTGGGATCCCGGGGGGCGTGCTGTGACGATT TTCCCCCCCCGAGGTGTGTCTGAGAAAAAGCCGCCCCCCCGCCTTTGG	T. inter
171026001 0	AGAATTTGGCGCGCAGCCGGAGCTGGCCCCCACGATAGGGCCAAACG TCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTG TCTACATTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAGCC	T. inter

	<p>GTTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCG  GAGGACAGACGCAAAAAAATTCTTTTCAGAAGAGCTGTCAGTCTGAGCGT  TAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCG  GCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGA  ATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTG  CGGGGGGCATGCCTGTTTCGAGCGTCATTTTCAGCCCCCTCAAGCCCGGCT  TGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGAC  GCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGAA  TGGGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAT  CTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTG  AACTTAAGCATATCAAAGGCCGGAGGAAAGTTGGCCCCCGAAGCGGG  ACGCTGGCCCCCAGATGGGGCAAACGTCGCGGGGTGACCCATGTGCC  GGCGTACGCCCAATTCTGTACATTACCGGTTGCCCGGAGGCCCGCTCT  CCAGACACCTTTGGGAGCCTCTCTTTGTGGGCCCCCCCTGGACCGCCCG  CGAAGAATAACCAAAAATTTTTCGAAAACGGTGGTGGACGTAGCAGCAG  AATAGTTTAACTTTACCCGGATCTCTGGTGTGGCTCAAAGAAAAAGCGC  GGAATGCGATAGGTAAGGGTGAAATGGAACTGTGTATATCTCAATTTG  AACATGAGCCCCGGGGTTCGGGGGGGCGGCGTTTAGCCTTTCTCCAC  CCGCTGTGTGCGGTGAGAGACGACCCCCCGCCTTTGGGGTTCGAGAAGCC  CGAAAACGACAAGACCGTCCCGCTTCGGGGCAAGGGAACACAGCCC  CTCTCAACCGCCCGGGCGAAATTTTTCGTCTGTTAGTGATTACGTCTGTG  ATGGAGATCACACATTACTAGACTTTGTGAGGGGAGGGTACACGACG</p>	
<p>180925006 5</p>	<p>GGGCTGGCGCGCAGCCGGAGCTGGCCCCCACGATAGGGCCAAACGT  CCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGT  CTACACTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCG  TTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCGG  AGGACAGACGCAAAAAAATTCTTTTCAGAAGAGCTGTCAGTCTGAGCGTTA  GCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGC  ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT  CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG  GGGGGCATGCCTGTTTCGAGCGTCATTTTCAGCCCCCTCAAGCCCGGCTTGT  GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC  GCCCCAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGAATG  GGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT  GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA  CTTAAGCATATCAATAAGGCGGAGGAAACGAAAGGGGGGCCCGCCG  GAGGCTGGCCCCCCATAGGGGCAAACGTCCGTGCGGGGTGAGCACATC  CGCTCGGCGTACGCCCAATTCTGTCTACTTACTCGGTTGCTCCGCGGGC  ACGCTCTCCAGGAGAACCTTTGCTAGCTCTTTTAGTGGCTAAAGCTGG  ACGGCCGCCGGAAGAAGACCATAAAATCTTCGAAACTGTCGTTGACCTT  AACAGCAAAAATAATTAATTTCAACGAATCTTTGGTTCGGCTCAAAAAAA  CACGGAAGCCATAAGTAGGTGGAATGATAAGTCGGAATCCCATCTTTGA  CATGAGACCCGCGGCTTCCGGGGATGCCTGTTGAGCTTTTCTCCTCTCC  CGGTGCTCGATGGAAAAATCCCCCGCGCCTTTGCGGCTCTGAAAACC  CCGAGAAGAGTGACCAAACCTTATGTGGTTGTTGGGTGAGGGGGAAACC  CGCGCCGCCGAAAACGACGCGCGGCCGCCAAACAGCTTGTCTACTGAC  AGCATGTCTCTCGTACATAGTGTGAGAGATACCCCCACTCAATATAAAT  ACCTCCATGCGGAGGGGAGGCGGGCACTCCCT</p>	<p>T. inter</p>
<p>161208006 5</p>	<p>GGGGGTTTCGCGCGGCCGGAGGCTGGCCCCCACGATAGGGCCAAACG  TCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTG  TCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCC  GTTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCG  GAGGACAGACGCAAAAAAATTCTTTTCAGAAGAGCTGTCAGTCTGAGCGT</p>	<p>T. menta</p>

	<p>TAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCG  GCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGA  ATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTG  CGGGGGGCATGCCTGTTGAGCGTCATTTAGCCCCCTCAAGCCCGGCT  TGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGAC  GCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCAGGCGAA  TGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAT  CTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTG  AACTTAAGCATATCAAAGGCCGGAGGAAAGGATCTTGCCCCAGGCGG  AGGCGGCCCCCACTATGGGGCAAAGTCCGTGCGGGGTGAGCACATGCTG  GCGGCGTACGTCCATTCTTGTCTCGTTAGCGGTAGCTCGGCGGCGCG  CTCTCAGGAGACCTTTCGCGAGCTTCTTAGTGGCTAGCCTGGAGGCCG  GCGGAGAGAACC AAAAATCTTTCGGAGACGTCAGTCGACCTTAAAGCAA  AATAGTTAACTTTCACACGATCTTTGGCTTCGCATCAAAGAACCACGAA  TGCATAGGTATGGTGCAATTATACTCTGTGTCCAATCTTAAGACATGGA  CCCGGGCATTGAGGGATGCTGTTAGAGCTTACCTCCACGGTGTGCGA  GAGAAGACTCGCCCCGTCTCGGGTAGAGGACCGCGAAATGTACAGGCC  ATTGCTCTGCAATGGGTCACCGCCTCCAGGCCTGGGCAGATTCTTTG  CAATTTCTCTAATGGTTAGGATCCTCACAAATAGCGTTATATCGGGGGAG  AGAAAA</p>	
<p>180814002 9</p>	<p>TGGGGTCGCGCAGACGGAGCTGGCCCCCACGATAGGGCCAAACGTCC  GTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGTCT  ACCTTACTCGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCGTT  CGGCGAGCCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCCGGAG  GACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGTTAG  CAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGCA  TCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATTC  CGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCGG  GGGGCATGCCTGTTGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGTG  TGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGCG  CCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCAGGCGAATGG  GCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCTG  TTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAAC  TTAAGCATATCAATAAGGCCGGAGGAAAGTTTATAACGCCCGCGGAGGC  GGCCCCCAGATAGGGCAAACGTCCGTCAGGGGGTGAGCAATGTGCGCG  GCGTACGCCCATCTTGTCTACTTACTCGATTGCTCGCCGGGCGCGCTC  TCCCGAAAAGCCTTTCGCGAGCTCTTTTTAGTGGCTTAACTGGGCC  GCCGCCGAGGACAAAACAAAAAATATTTTAAAGAAACGTCGTCTGAGGTTT  ACAGGAAAAGGTTAACTTCACAAGGAACCTTTGGTTCGGCTAATAAAAACC  CCGAATGCGAAAAGAAATGGGGAAATTGAAAAGTTGAATCAATTTAAGAAT  AGCGTCGCGGGATGGGGGGGGGTGTCGTGTGTGTCTTTCTCCCCCG  GCGGTGTGTGGATGAAACACCGCCGCTTCTTGTGGTGGCAGAGCACG  ACGAAGAAGAGCCGCGCTCTGCGCTTTCGTGTGGTATGAGGGAAACAAC  GGCCGTCCGACGACGCGCCGTGCGCGAGGTGGTTTCTTGTGACTGAAA  GTATCA</p>	<p>T. menta</p>
<p>180730002 3</p>	<p>CGGGTTTTCGGCGCAGCCGGGAGCTGGCCCCCACGATAGGGCCAAACG  TCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTG  TCTACCTTACTCGTTGCCTCGGCGGGCCGCGCTTCCAGGAGAGCC  GTTCCGGCGAGCCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCG  GAGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGT  TAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCG  GCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGA  ATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTG</p>	<p>T. menta</p>

	<p>CGGGGGGCATGCCTGTTTCGAGCGTCATTTTCAGCCCCCTCAAGCCCCGGCT  TGTGTGATGGACGACCGTCCGGCGCCCCCGTTTTTGGGGGTGCGGGAC  GCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAA  TGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAT  CTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGAATACCCGCTG  AACTTAAGCATATCAATAAGGCGGAGGAAAGATGGTTACGCGCAGGCCG  GAGGCTGGCCCCAGATAGGGGCAAACGTCCGTCAGGGGTGAGCAGAA  TGTGCGCGGCCGTACGCCCCATTCTTGTCTACTTACTCGGTTGCTCGGC  GGCGCGCTCTTCAAGGAAAGCCGTTTCGGAGGCCTCTCTTTAGTGGCTA  AAGCTGGACGCGCCCGCGAGGAAGAACAACAAAAATCTTTTAAAAAACTG  TCGTCTGACCGTTAAAGCAAATATTTAACTTTCAACAGGATCCTGGGTC  CGGATCAAGAAAAACAGCAAGGGAATAGGTAATGTGAAATGCAAAAT  GGAAATCCAACTCTATGAGCAATGCACCCGGGCTTGGGGGGGAATCC  GTGTAGAGGTTTTTCTCCACCCGCGTGTGTGTAGGAAAACACTCCCC  CGCGTCTTCTTTGAGGGGGAGAGACGCCCGAAAAACAGTGGCAGGCCG  CATTCGACGTCGTCGTGCGAAGAGGAACAACACGGCCTCCGAACAGG  CGCCCCGGCCCCCTAATCTTTTGTATGTAGAG</p>	
<p>180604000 7</p>	<p>AGGGGGTTGCGGCGCAGACGGAGCTGGCCCCCACGATAGGGCCAAA  CGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCT  TGTCTACACTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAG  CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGC  CGGAGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGC  GTTAGCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTC  CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA  GAATTCGGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT  TCCGGGGGGCATGCCTGTTTCGAGCGTCATTTTCAGCCCCCTCAAGCCCGG  CTTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGG  ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCG  AATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA  ATCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGC  TGAActTAAGCATATCAATAAGGCGGAGGAAACTTCATACCCCCAGGC  GGAGGCTGGCCCCCACGATGGGCCAACGTCGTCGGGGTGAAGCAATGT  GCCCGCCGTACGCCATTCTGTCTGCATTACTGGTTGCCTCGGCGGGC  GCGCTCTCCAGGAGAGCCTTCGCAAGCTCTCTTTAGTGGCTGAACCTGG  AGCGCCGCGGAGGAAGAGCAAAATTTTTTCGAGACTGTCGTCTGACTTTA  CAGCAAAATAGTTAAATTCACACGGATCTCTGGCTCGGCTCAAGAAAGCA  CGAATGCGATAGTAAGTGAATGCTAAGTTCGGATCGCATCTTTGAGCAATA  GACCTGGCATTCCGGGGGCGAGCTGTCAGGTCTATCTCCCTCCACGGTG  TTATGAAAGTCAGCGGTTTGGGTGGAACCGAAACTGCAGCGATCCGCTG  GCAGGACATAACTGCCGACAGGCCCGGCAACTTGTCTGTGAGTCCAG  AATGGGAGATAGGCCATGACTACGTACG</p>	<p>T. menta</p>
<p>180209003 2</p>	<p>AGGGCTCGGCGCAGCGGAGCTGGCCCCCACGATAGGGCCAAACGTC  CGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGTG  TACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAGCCGT  TCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCGGA  GGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGTTA  GCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTCCGGC  ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT  CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG  GGGGGCATGCCTGTTTCGAGCGTCATTTTCAGCCCCCTCAAGCCCGGCTTGT  GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC  GCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAATG  GGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT</p>	<p>T. menta</p>

	<p>GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA  CTTAAGCATATCAAAAAGCCGGAGGAAATGGTGGCCCCCAGCCGGAC  GCTGGACCCCGATGGGGCAAACGTCCGTTGAGGGGTGACCGATCTG  GCGGCGAACGCTCCATTCTTGTCTACTTACTCGATTGCCTCGGCGGGCC  CGCTCTCCAAGACAGCCTTCGGCGAGCTCTCTTAGTGGCGAACGCTGGA  CGGCCCGCCGAAGAAAAATCAAAAATTCTTCCAAGACTGTCCTTGGAGC  GTAGCAGCAAAAACATTAATAATTTAACACGGATCTCGGCTCCGCCTCAT  AAAAAGAAGGAATGCAATAGTATGGTGAATGTGAGAAGTCGGAATCC  CAACTTTGAGAGCATTAGAGCCCGGGGATGCGGAGAGAAGCGTGTGT  GAGAGTTTTCTCCCTCCCCGCCTGTGTTGTGTGGTGA AAAACTCGGCGC  GCTCTTTTTGTCTGTGTGAACCGCCGAAAACATGTAAAGGACACCTTTGT  CTCTGGGGGAAGGGGGAACAACGGCGACCGACAGAACAGCAGCGCTG  GGCTAATATATCGTTCTAGTGGAGATCGATTACTAATGAGGTGTGAAGTA  CTCTACTATATAACTGGTAGTGGAGGGAGGAAAAA AAAAAACA</p>	
<p>180925003 1</p>	<p>TGGGCTTCGCGCAGCGGAGCTGGCCCCCAGATAGGGCCAAACGTCC  GTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGTCT  ACCTTACTCGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCGTT  CGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCGGAG  GACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGTTAG  CAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTCCGGCA  TCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATTC  CGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCGG  GGGGCATGCCTGTTGAGCGTCATTTAGCCCTCAAGCCCGGCTTGTG  TGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGCG  CCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAATGG  GCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAATCTG  TTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAAC  TTAAGCATATCAAAAAGCCGGAGGAAAGGTTGTCCCCCAGCGGGAC  GCTGGCCCCACGATGGGGCAAACGTCCGGCAGGGTGAGCACATCTGCG  CGGCGTACGCCATTCTGTCTCCTTATCGGTGCTCGCGGGCGCGCTCTC  CGGCACACCTTTGGGAGCTCTCTTTGGTGGCTAAGCCGGGGACGCCGC  CGAAGGAAGATCAAAAATTCTTCTAAGACTGTAGGCGGAGCATTACAGA  AATCATTAAATTTAACACGAGTCTCTGGGTTGGCACATGAAAGACCG  GAAATGCAATAATAAGTGTGAATTTGCAATCTTGAATGCACTTTGCAGC  CATGGCCCGCGCATCCCGGGGGGAGCGGTTTGTAGCTCTATCTCCCCC  CGGTGGCGCGATATAAAAAACGCGGGTTCTTTGGTGTAGCAGAACCCC  CAAAACAAAAAAGACCCAATTTCCGCCCTTGGCCAGGGAATAACAAAC  CAGGCCTGCACAGAAAGCGACCACGGGCGCCCGAACATATTTTTTCTCT  TTGCACAAATGTCACTACACACAGATGAGATAACACCCAATAATAGAC  AATCTAACGGCGGGAGAGAGAAAAAATTTA</p>	<p>T. menta</p>
<p>IHEM 4268</p>	<p>GGGTTTCGCGCGGCCGGAGGCTGGCCCCCAGATAGGGCCAAACGT  CCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGT  CTACCTTACTCGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCCG  TTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCGG  AGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGTTA  GCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTCCGGC  ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT  CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG  GGGGGCATGCCTGTTGAGCGTCATTTAGCCCTCAAGCCCGGCTTGT  GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC  GCCCCAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGAATG  GGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAATCT  GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA</p>	<p>T. menta</p>

	CTTAAGCATATCAATAAGGCGGAGGAAAGAGTTCCCCCCCAGGCGGACG CTGCCCCCAGATAGGCCAAAGGCGGCAGGGGTGAGCCATGTGGCCG CGTACCCCCCTTTCTTGTCTACTTACTCGGTTGCTCGGGGGGCGCCTCT CCAGGATATCTTTTCGCGAGCTTCTTTGGGGCTGACCCGGGGCGCCGC CGAAGAAAAACAAAAAATTTTTCAAAAACGTTGTCGACCTTTACAGCAAAA TTTTTTAAAATTTAAAGGATCTTGGCTCCGCTAAAGAAA	
190220-0076	TGGGCTTTGGCGCAGGCCGGAGGCTGGCCCCCAGATAGGGCCAAAC GTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTT GTCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGC CGTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCC GGAGGACAGACGCAAAAAAATTTTCAGAAGAGCTGTCAGTCTGAGCG TTAGCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTCC GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG AATCCGTCGATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT CCGGGGGGCATGCCTGTTTCGAGCGTCATTTACGCCCTCAAGCCCGGC TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCCTAGGCGA ATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAA TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGATAACCCGCT GAACTTAAGCATATCAATAAGCCGGAGGAAAGTTTAGGCACCCCCAGTG GGCGATGGCCCCACGATGGGGCAAACGTCGTCAGGGGGTGTGACATC TCGCGCCTTACACCCATTCTTGTCTACTGAGTCAGTTGCTCGGCGGGCG GCTCTCCAGAAATCTTTTCGTGAGCTCTTATGGCTACCCTGGACGGCG CGAGAAAACCAAAAAATTTTTAGAGACTGCGGTTGTACATAACAGCGAGAG TATTAATTATACAGATTCTGCGTTGCTCATGAAAAGAGGAAAGCAATA GGAAGGTGAATGGGAATTTGCATTCACTGTAACATGGCGGCCTTCCGG GGGATGTGTGTGCCTTTCCCTACCCGTCTCGCGTCGTATAGAAAACGAGC GC	T. menta
190226-0091	GGCCTTGCGCGGCAGGCCGGAGGCTGGCCCCCAGATAGGGCCAAA CGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCT TGCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTTCCAGGAGAG CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGC CGGAGGACAGACGCAAAAAAATTTTCAGAAGAGCTGTCAGTCTGAGC GTTAGCAAGCAAAAATCAGTTAAACTTTCAACAACGGATCTCTTGGTTC CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA GAATCCGTCGATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT TCCGGGGGGCATGCCTGTTTCGAGCGTCATTTACGCCCTCAAGCCCGG CTTGTGTGATGGACGACCGTCCGGCGCCCCCGTTTTTTGGGGGTGCGGG ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCCTAGGCG AATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA ATCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGAATACCCGC TGAActTAAGCATATCAATAAGCGGAGGAAAGGCGGGCCCCCCCCCGC GGCAGGCTGGCCCCACGATGGGGGCAACGTCGTCGGGGGTGAGCCAT GTGCGCGCGTACGCCATTCTTGTCTACTTCTCGGTTGCTCGGCGGGCG CGTCTTCAGGACATCTTTTCGGATCTCTTTTTGTTGGCTACCCGGGAGGG CGCGGAGGAAAGCAAAAAATCTTAAAGAAGTGTGTGGGGCTAGACAGAG AAATATATAAAATTTACAGGATTTGGTTGGCATATGAAGAAGCACAAATG GATAGGTAATGGTGAATTGCGAATTTGAAACACAAACTCTAAAATGCT	T. menta
IHEM 4203	TGGGCTTTTCGGCGCAGGCCGGAGGCTGGCCCCCAGATAGGGCCAAA CGTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCT TGCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAG CCGTTCCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGC CGGAGGACAGACGCAAAAAAATTTTCAGAAGAGCTGTCAGTCTGAGC	T. menta

	<p>GTTAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTC  CGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCA  GAATCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCAT  TCCGGGGGGGCATGCCTGTTGAGCGTCATTTAGCCCCCTCAAGCCCGG  CTTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGG  ACGCGCCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCG  AATGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA  ATCTGTTTTATACTTATCAGTTGACCTCGGATCAGGTAGGGATACCCGC  TGAACCTTAAGCATATCAATAAGGGCGGAGGAAGGTGCCCCCCCCGAAG  GGGAAGGCGGCCTCAGGATAAGGCAAAGTCGTGAGGGGTGAGCCCAT  GTGGCGCCTTCCCCATTCTTGTCTGGTACTCGCTGCTCGAGAGGCGC  CTCTCCAGGATATCTTTGGGAGCTCTCGTAGTGGCCCCCGCGGGAGC  GCCGCCGAAGACATCCCAAAAATCTTTCAACGACGGGGTGGAAACATAG  AAGCGAAATATATAAATTACACACGATCCTGGCTTCCGAGAAAAAAGG</p>	
<p>IHEM 10342</p>	<p>GGCTTTGCGCGCAGCCGGAGGCTGGCCCCCACGATAGGGCCAAACGT  CCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTGT  CTACACTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAGCCG  TTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCGG  AGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCGTTA  GCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCCGGC  ATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGAATT  CCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATTCCG  GGGGGCATGCCTGTTGAGCGTCATTTAGCCCCCTCAAGCCCGGCTTGT  GTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGACGC  GCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGAATG  GGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAATCT  GTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTGAA  CTTAAGCATATCAAGGCCGGAGGAAATTATAAGGGCCCCCCCCACGGGAG  GCTGACCCCCACATGGGGGCAAAAATCAGTCGGGGGGGAGCACATCTG  CTCTGCGTACTTTTTATTCTTTGTCTCGTACTCGGTAGCTCGGGGGCAC  GCTCTCCAGGACATCTTTGGGAGCTCTCTGTGTGGCTAGCGCTGGAGCG  CCGCGGGAGAAAAACCTAAAATCTTTGGAAGACTGTCGTCCGAGGCAT  ACAGCAAATGGTTAAATTTACACGAGCTTGGTTCCGCTCAAAGAAGCAACG  AAGGCGAAAGTGAGGTGAAATGATAAGGCAGTAATATCTATTTTGAACAA  GCCGGGGTTCCGGGGGGCGACGGTGTAAAGCTATTCCCTCTCCGCGGGG  GTGAGGGAAGCGTGG</p>	<p>T. menta</p>
<p>IHEM 584</p>	<p>AGGCTTTGGCGCGCAGCCGGAGGCTGGCCCCCACGATAGGGCCAAAC  GTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTT  GTCTACACTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCCAGGAGAGC  CGTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCCGCC  GGAGGACAGACGCAAAAAAATTCTTTCAGAAGAGCTGTCAGTCTGAGCG  TTAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGGTTCC  GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG  AATCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT  CCGGGGGGGCATGCCTGTTGAGCGTCATTTAGCCCCCTCAAGCCCGGC  TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA  CGCGCCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTAGGCGA  ATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAA  TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCT  GAACTTAAGCATATCAATAAGGGCGGAGGAACGGTAGAGCGCGGCCCGC  GGGAGGCTGGCCCCACAATGGGGGCAACGTCATTGGGGGTGAACACAC  CCGCCCGGCTACCTCCCATTCTTGTCTCTTACGCGGTTGCTCGGCGGG  CCGCTCTCCAGGAACACCGTTTGGCAGCCCTCTTAGTGGGTGCGCCGG</p>	<p>T. menta</p>

	GGCCGCCGCCGGAGAGAAAAACAAAAATTTTAGAGAAGGGTGTTCGAG GGTAAAAAGAAAAATTAACCTTGAGATGATTCTGGGGTCCGCACGTAAA GAAACAGCGAAGGAAAAAGAGAAGGTGAAAAAGAGAATTCGAGATTCTT AATCTTTTTAGATCGCGCGGCTGTGCGGGGGGGGGTGGGGGGGGTTTG CCCTCCCGGGG	
IHEM 620	AGGGGTTTCGCGCAGCCGGAGGCTGGCCCCCACGATAGGGCCAAACG TCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTTG TCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGCC GTTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCCG GAGGACAGACGCAAAAAATCTTTTCAAGAAGAGCTGTCAGTCTGAGCGT TAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGTTCCG GCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAGA ATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT CGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGCT TGTGTGATGGACGACCGTCCGGCGCCCCGTCTTTGGGGGTGCGGGAC GCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCAGGCGAA TGGGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAT CTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCTG AACTTAAGCATATCAAAGGCGGGAGGAAACCTCGTCCCCCAGCCGGA GGCTGGCCCCACGATGGGGGCAAAGTCGTCGGGGGTGAGCACATCTGC GCGCGTACGCCATTCTGTCTACTTGTCTCGGTTGCTCGCGGGCGCCTCT CCGAGAGAACCTTTGGGAGCTCTCTTAGTGGCTAACGCTGGGACGCCG CGAGAAAACCTAAAAATCTTTTCAAGGACTGTCGTGAGGGTTAACGAG CGAAAATGTTTAAAACCTTAAAGGATTCTTGCTTCGCTCAATGAACAAGA CGAAGTGCAATAGGTAATGTGAATGGATAAGTCCGTAATATAATTCTTTA AATTGCGCGGGACTTGCGGGGGGATGCGGATGATGTGA	T. menta
190129- 0017	AGGACTTCCGCGCAGCCGGAGGCTGGCCGCCACGATAGGGCCAAAC GTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGTCCCATTCTT GTCTACCTTATTCGGTTGCCTCGGCGGGCCGCGCTCTCTCAGGAGAGC CGTTCGGCGAGCCTCTCTTTAGTGGCTCAACGCTGGACCGCGCCCGCC GGAGGACAGACGCAAAAAATCTTTTCAAGAAGAGCTGTCAGTCTGAGCG TTAGCAAGCAAAAATCAGTTAAAACCTTTCAACAACGGATCTCTTGTTCC GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG AATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT CCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGC TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCAGGCGA ATGGGCAACAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAA TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATACCCGCT GAACTTAAGCATATCAAAGGCGGGAGGAAAGCTGAGGGCCCCCAGGC GGAGGGCAGCCCCCTATGGGGGCGAAAATCGTAAGGGGGGAGCGAA CTGCTCGCCGTACCTTCTTTTTGTCTACTTATGCGGTTCTCGCGGGCC CCTCTCTCGAGACACCTTTTTGGAACCTCTCTTTAGTGGGGTCCCCTGGA CGCCGGCGGAGAAAAACAAAAAAAATTTGAAAAGACGTGCTGTGAAGA TTAACAGAAAAAAGATTATATTTTCAACGAACCTGGGTTTGGCTAATAAAA AAAAAAGGAAAGACAATAAGTAAGGTGATAGAACAATGCGTAAACCAAT TTGATAACATGCCGGGCTG	T. menta
190315- 0029	TGGGCTTCGGCGCAGCCGGAGGCTGGCCCCCACGATAGGGCCAAAC GTCCGTCAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTT GTCTACCTTACTCGGTTGCCTCGGCGGGCCGCGCTCTCCAGGAGAGC CGTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCC GGAGGACAGACGCAAAAAATCTTTTCAAGAAGAGCTGTCAGTCTGAGCG	T. menta

	<p>TTAGCAAGCAAAAATCAGTTAAAACTTTCAACAACGGATCTCTTGTTCC  GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG  AATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT  CCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGC  TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA  CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGA  ATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAA  TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATAACCGCT  GAACTTAAGCATATCAATAAGGCGGAGGAAAGGTCATTACCCCCAGCCG  GAAGCTGGCCCCACGATAGGGCCAACGTCGGTCCGGGGGTGAGCGAT  GTGCCCGGCGTACGCCATTCTGTCTACTTATTGGGTTGCTCGGCCGGC  GCGCTCTCCAGGAGAGCGTTCCGGAGCTCTTTAATGGCTAACGCTGGAC  GCCCCGCGGAGGACGACCAAAAATTCTTTGAAAACGTGCTGTTGAGCTTTA  CGGCAAAATATTAACTTTCAAGGATCTTTGCTTCGGCTCATAAAAACAG  AAGCAATAAGTAAGGTGGAATGAAAATCGAATATCATTTTTAAACATTGC  GGCGTCCGCGGGGACGCGTGATGACGTCTTCTTCTCCCCCGTGTGGA  GGACAACCACCACCCGCTCTTTGGGGGTGAGAG</p>	
<p>190313- 0069</p>	<p>AGGCTTGGCGCGCAGCCGGAGGCTGGCCCCCAGATAGGGCCAAAC  GTCCGTGAGGGGTGAGCAGATGTGCGCCGGCCGTACCGCCCCATTCTT  GTCTACATTACTCGGTTGCCTCGGCCGGCCGCGCTCTCCAGGAGAGC  CGTTCGGCGAGCCTCTCTTTAGTGGCTAAACGCTGGACCGCGCCCGCC  GGAGGACAGACGCAAAAAATTCTTTAGAAAGAGCTGTCAGTCTGAGCG  TTAGCAAGCAAAAATCAGTTAAAACTTTCAACAACGGATCTCTTGTTCC  GGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTGCAG  AATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCCCTGGCATT  CCGGGGGGCATGCCTGTTTCGAGCGTCATTTAGCCCCCTCAAGCCCGGC  TTGTGTGATGGACGACCGTCCGGCGCCCCCGTCTTTGGGGGTGCGGGA  CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTAGGCGA  ATGGGCAACAAACCAGCGCCTCCAGGACCGGCCGCCCTGGCCTCAAAA  TCTGTTTTATACTTATCAGGTTGACCTCGGATCAGGTAGGGATAACCGCT  GAACTTAAGCATATCAATAAGCCGGAGGAAAGCTCCCCCCCCGAGCGG  CAGCTGGCCCCACGATAGGGCAACGTCGGTCCAGGGGTGAGCCCATGT  GCGCGCGTACGCCATTCTTGTCTACATTACTCGGTTGCTCGCAGGCGC  GCTCTCCAGGACATCGTTTGGCGAGCTTCTTTAGCGGCTAAGCTGGAC  GGCCGCCGAAGAAAAGCAAAAATCTTTCAAGACTGTCGTGAAGTTAGCA  GCAAGATGTTAAACATTACAGGATCTCTGCTCGCATCATCAACAGCACAA  ATGCAATAGTAATGTGAAATTGCAAATGCGTAATCTCATTTTTGTAGCATTT  GCTGGCATCGGGGGACGTCGATTGCAGTCTTCTCACGGCGCTGTGA  GGACACACCGCCCCTCTCTC</p>	<p>T. menta</p>

Table 12: Results of Tef- 1 $\alpha$  sequencing in *T. interdigitale* and *T. mentagrophytes*

Number	Sequence	ID
170824000 8	TGKCGGAATCGCGGGCGATCKATGGGATCAATCCAGACTACTGGAAGRC CAKCCACGAGATATACATAACCACTAGCCAGGCACCACACACTACACACA GAAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCCTTTTGT GACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTCT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCT TTTTCTGTCTTCMGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGA ARAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTC AAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGT TCGAGACCCCAAGTACMATGTCACCGTCATTGGTATGTTTTCTCTTTAC CTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC CCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCYAGG CCGACTGTGCTATTCTCATCATTGCTGCCCKGGTACTGGTGAGTTCGAGG CTGGGTATCTCCAAGGATGGGYYATASCYGKTTYCCTGAA	T. inter
170428005 4	TGACGTATCGCGTCCTTCTATTCCGGCTATCCACCACTACTGGTAGGCC RGCCACGAGAATATACATAACCACTAGCCAGGCACCACACACTACACACA GAAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCCTTTTGT GACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTCT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCT TTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAA GAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT CGAGACCCCTAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACC TTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC CCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGC CGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGCT GGTATCTCCAAGGATGGGTCTAGCCKGTTTCCTAAA	T. inter
170410006 0	GGCCGGCCWCKGCCWCACCRKTACYGGSASYRAKGC AKTGAGAWTW RMACAGTCGGCCTGGGAGGTACCAGTGATCATGTTCTTGATGAAGTAC GGTGACCGGGGGCGTCTACTCTCGTTAGTTATGGCACAGCAAGACGATG GAGGGGAAAGGTAAAGAGAAAACATACCAATGACGGTGACATTGTACTT GGGGGTCTCGAACTTCCAGAGGGCGATATCGATGGTGATACCACGCTCA CGCTCGGCCTTGAGCTTGTCAAGAACCCAGGCGTATTTGAAGGACTTCT TGCCCAACTCTTCGGCTTCCTACAGGTACCTTGTTAGCATCGACCCTGAA GACAGAAAAAAGCAAATCTGAACATGACATGAGGCTCGATCGTTGCCTG GAGCGATGGCTGCATGTTTTGATGTTGGTGGGGGGTGGATTTTGCTGCC CAAGCGAGTGCCAAGCCACATCCCACCAAGCAACAAAAAAGTTCGCCTG TGGTGGGTTGAAGAAAGGGAGAGAAAAAATGTGCAGCGGAACGAATGA GACAGCAGGGTCAAACAAAAGGGTTATTTACCTTCTCGAACTTCTCAATG GTACGCTGGTCGATACCACCGCACTTGTAGATCAAGTGACCTGTAATGTT ATAGTCAGTTTCTGTGTGTAGTGTGTGGTGCCTGGCTAGTGGTATGTATA	T. inter

	TCTGGTGGCTGGCTTACCAGTAGTGGTGGATTTGCCGGAATCGACGTGG CCGATAACGACCAAGTTAATGTGACTGGCGSTYCGTTTTTACAA	
170314006 9	TGGCGTATCGCGTYTTTCGCTTCGGATCTCTCCKGACTGCTGTATAATGT TTCACGAGAATATACATAACCACTAGCCAGGSACCACACACTACACACAGA AACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCG ACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGTTTGA CCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTCTTCA ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA CTCGCTTGGGCAGCAAAATCCACCCCCMCCAACATCAAACATGCAGC CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAAGATTTGCTTTT TTYTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAAGA GTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCAAG GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTCTG AGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGCCGAC TGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGCTGGTAT CTCCAAGGATGGGTCATAGCYKGTTCCTGA	T. inter
171026000 6	TSYGGTTATCGGYSRCGATCKATTCCGGCARATCCACCRCTRCTGGTAR RCCAGCCACCAGRATATACATAACCACTAGCCAGGCACCACACACTACAC ACAGAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGG TATCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTG TTTGACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTT CTTCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTT GGCACTCGCTTGGGCAGCAAAATCCACCCCCACCAACATCAAACATG CAGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAAGATTTG CTTTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCG AAGAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCT CAAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAA GTTTCGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTT ACCTTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGC CCCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAG GCCGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGG CTGGTATCTCCAAGGATGGGTCATAGCTKGTTCYTA	T. inter
171026000 4	TGAYGTATCGCRGAACAGCTGGTATCTCCAAGGATGGGTCTRTARCTGT TTCAAGAGATATASATACCRYTAGCCAGGCACSACRCACTACACACAGAA ACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGA CCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGTTTAC CCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTCTTCAA CCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCAC TCGCTTGGGCAGCAAAATCCACCCCCACCAACATCAAACATGCAGCC ATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTARATTTGCTTTTT TCTGTCTTCAGGGTCRATGCTAACAAGGTACCTGTAGGAAGCCGAAGAG TTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCAAGG CCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTCTGA GACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT CCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCGG TCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGCCGAC TGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGYKGGTAT YTCCARGGATGGGTCATASCTGTTTYCYWGA	T. inter
171025008	TGGYSGTATCGSYMSGTTCKATTCCGGCARATCCACCRCTRSTGGTARR	T. inter

1	<p>CCRKCCACCSAGAATATACATAACACTAGCCAGGCACCACACACTACACA  CAGAAACTGACTATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGT  ATCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGT  TTGACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTC  TTCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTG  GCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGC  AGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTGAGATTTGC  TTTTTTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCGA  AGAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTC  AAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGT  TCGAGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTAC  CTTCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC  CCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGG  CCGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTGAGGC  TGGTATCTCCMAGGATGGGTCATAGCYKGTTCCKTAA</p>	
171026000 7	<p>AGGCGTATCGGYACGWTCKATTCCGGCAATCCACCACTACTGGTAGRCC  AGCCACCAGAATATACATAACACTAGCCAGGCACCACACACTACACACA  GAAACTGACTATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTAT  CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGT  GACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTCT  CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG  CACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCA  GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTGAGATTTGCT  TTTTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCGAA  GAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCA  AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGT  CGAGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACC  TTTCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC  CCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGCC  GACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTGAGGCCTG  GTATCTCCMAAGGATGGGTCATASCTGGTTTYCCTGAA</p>	T. inter
171026000 9	<p>TGCGTATCGCGTCCGATCKATTCCGATCKATCCACCACTGCTGGMTAGA  CAKCCACGAGATATACATAACACTAGCCAGGCACCACACACTACACAC  AGAAACTGACTATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTA  TCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGT  TGACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTCT  TCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTG  GCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGC  AGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTGAGATTTGC  TTTTTTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCGA  AGAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTC  AAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGT  TCGAGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTAC  CTTCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC  CCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGG  CCGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTGAGGC  TGGTATCTCCAAGGATGGGTCATAGCCTGTTTCCTGA</p>	T. inter
171026001 0	<p>TGAYGTATCGSGYSASGWTCKMTTCCGRTRRATCCACCRCTRYTGSCA  ARCCRGCCACCAGRATATACATAACACTAGCCAGGCACCACACACTACA  CACAGAAACTGACTATAACATTACAGGTCACTTGATCTACAAGTGCGGTG  GTATCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTT  GTTTGACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCT</p>	T. inter

	TCTTCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCT TGGCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACAT GCAGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTT GCTTTTTTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCC GAAGAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGC TCAAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAA GTTTCGAGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTT ACTTTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGC CCCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAG GCCGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGG CTGGTATCTCCAAGGATGGGTCWAGCCKKTTTCCTAAA	
180925006 5	TCCGGTATCGGYCCKTCKATTCCGGCAATCCACCACTACTGGTAAGCCR GCCACCAGATATACATAACCACTAGCCAGGCACCACACACTACACACAGA AACTGACTATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCG ACCAGCGTACCATTGAGAAGTTTCGAGAAGGTAAATAACCCTTTTTGTTTGA CCCTGCTGTCTCATTGTTCCGCTGCACATTTTTTTCTCTCCCTTTCTTCA ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA CTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCAGC CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCTTTT TTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCGAAGA GTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCAAG GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTTCG AGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCCGA CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGGCTGGT ATCTCCAAGGATGGGTCATAGCCTGTTTTYCTGA	T. inter
161208006 5	TGACGCATCGCRTGGGTTTCGCTGGGATCTCTCCGGCTGTGGTGTATGTG TTTCWACGAAATATACATAACCACTAGCCAGGCACCACACACTACACARAA ACTGACTATAACAATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCG ACCAGCGTACCATTGAGAAGTTTCGAGAAGGTAAATAACCCTTTTTTTTGA CCCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTTTCTTCA ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA CTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCAGC CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCTTTT TTCTGTCTTCAGGGTTCRATGCTAACAAGGTACCTGTAGGAAGCCRAARA GTTGGGCAAGAAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCTCAAG GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTTCG AGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCTGA CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAAGCTGGTA TCTCCAAGGATGGGTCATASCTGTTTTYCTGA	T. menta
180814002 9	TSSKKWWTYGGGGSMASGTCCGATTCCGGCAAATCCACCACTACTGGT AAGCMAGCCACCAGATATACATAACCACTAGCCAGGCACCACACACTACA CAGAACTGACTATAACAATTACAGGTCACTTGATCTACAAGTGCGGTGG TATCGACCAGCGTACCATTGAGAAGTTTCGAGAAGGTAAATAACCCTTTTT TTTGACCCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTTT CTTCAACCCACCACAGGCGACTTTTTTTGTTGYTTGGKGGGATGTGGCTT GGCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATG CAGCCATCGCTCCAGGCAACGATCGAGCCTCAKGTTCATGTTTCARATTTG CTTTTTTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTRGGAAGCCR	T. menta

	AARAGTTGGGCAARAAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCT CAAGGCCGAGCGKAGCGTGGTATCACCATCGATATCGCCCTCTGGAA GTTTCGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTA CCTTTCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGC CCCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAG GCTGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGG CTGGTATCTCCARGATGGGTCAWASCTGTTYCCTGA	
180730002 3	TGCCGGTTTTGSRGGAAMGCTGGKATCTCCMMGGATGGGTCRTARCTG TTTCCYGAGATATACRTACCGCTAGCGWGGCWCCACACACTACACACA GAACTGACTATAACATTACAGGTCATTGATCTACAAGTGCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTGTTT GACCCTGCTGTCTCATTGTTCTGCTGCACATTTTTTCTCTCCCTTTCTT CAACCCACCACAGGCRACTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACACCCCAACATCAAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCT TTTTTCTGTCTTCAGGGTCKATGCTAACAAGGTACCTGTAGGAAGCCGAA RAGTTGGGCAAGAAGTCCTTCAAGTACSCCTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT CGAGACCCCAAGTAC	T. menta
180604000 7	AGGCGTTTCGCGCCCRATCGATTCCGGCKATCCRCCACTACTGGTAAGC CAGCCACGAKATAGACATAACACTAGCCAGGCACCACACACTACACACA GAACTGACTATAACATTACAGGTCATTGATCTACAAGTGCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTGTTT GACCCTGCTGTCTCATTGTTCCGCTGCACATTTTTTCTCTCCCTTTCTT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACCCCAACATCAAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCT TTTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAA GAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT CGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACC TTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC CCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGC CGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGGCT GGGTATCTCCAAGGATGGGTCATAGCYTGTTCCTGAA	T. menta
180209003 2	TGCCGTATCGGCCGCAATCGATTCCGATCTATCCRGC ACTACTGKTAAG CCRKCCACGAGATATACATAACACTAGCCAGGCACCACACACTACACAG AACTGACTATAACAATTACAGGTCATTGATCTACAAGTGCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTTTTT GACCCTGCTGTCTGTTTCTGCTGCACATTTTTTCTCTCTCCCTTTCTT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACCCCAACATCAAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCT TTTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCRAA RAGTTGGGCAAGAAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT CGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCT TTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCC CCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCT GACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTRAGTTTCGAGGCTG GTATCTCCAARGGATGGGTCATAGSCTGTTTTYCYWAAA	T. menta

180925003 1	TGTYGTATCGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAGCC AGCCACSAGATATACATACTAGCCAGGCACCACACACTACACAGAA ACTGACTATAACAATTACAGGTCACCTGATCTACAAGTGCGGTGGTATCG ACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTTTTTGA CCCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTTTCTTCA ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA CTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCAGC CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCARATTTGCTTTT TTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCRAARA GTTGGGCAAGAAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCTCAAG GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTCG AGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCTTT CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCTGA CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGCTGGT ATCTCCAAGGATGGGTCTARCCYKKTTCCTGAA	T. menta
IHEM 4268	GTCGSCGYKTYSTACACRCCMRGTAMCGCGSASYRATGATGAGAATAGC ACAGTCTGCCTGGGAGGTACCAGTGATCATGTTCTTGATGAAGTCACGG TGACCGGGGGCGTCTACTCTCGKTAGTTACGGCACAGCAAGACGATGG AGGGGAAAGGTAAAGAGAAACATACCAATGACGGTGACATTGTACTTGG GGGTCTCGAACTTCCAGAGGGCGATATCGATGGTGATACCACGCTCACG CTCGGCCTTGAGCTTGTCAAGAACCCAGGCGTACTTGAAGGACTTCTTG CCCAACTCTTCGGCTTCCACAGGTACCTTGTAGCATCGACCCTGAAGA CAGAAAAAAGCAAATCTGAATATGACATGAGGCTCGATCGTTGCCTGGA GCGATGGCTGCATGATTTGATGTTGGTGGGGTGTGGATTTTGCTGCCCA AGCGAGTGCCAAGCCACATCCCACCAAGCAACAAAAAAGTCGCCTGTG GTGGGTTGAAGAAAGGGAGAGAAAAAATGTGCAGCGGAACSAATGAGA CAGCAGGGTCAAACAAAAGGGTTATTTACCTTCTCGAACTTCTCAATGGT ACGCTGGTCGATACCACCGCACTTGTAGATCAAGTGACCTGTAATGTTAT AGTCAGTTTCTGTGTGTAGTGTGTGGGTGCCTGGCTAGTGGTATGTATAT CTGGTGGCTGGGCTTACMAGTAGTGGTGGATTTGCCGGAATCGACGTG GCCGATAACSRACCAAGTTWAMTGTGACTTGGCCGKTYSTTTTTMWCAA ATT	T. menta
190220- 0076	GKGGGCCCTSGACTMCCAGTACCGGCAGCAATGATGAGAATAGCACAG TCGGCCTGGGAGGTACCAGTGATCATGTTCTTGATGAAGTCACGGTGAC CGGGGGCGTCTACTCTCGTTAGTTATGGCACAGCAAGACGATGGAGGG GAAAGGTAAAGAGAAACATACCAATGACGGTGACATTGTACTTGGGGGT CTCGAACTTCCAGAGGGCGATATCGATGGTGATACCACGCTCACGCTCG GCCTTGAGCTTGTCAAGAACCCAGGCGTACTTGAAGGACTTCTTGCCCA ACTCTTCGGCTTCCACAGGTACCTTGTAGCATCGACCCTGAAGACAGA AAAAAGCAAATCTGAACATGACATGAGGCTCGATCGTTGCCTGGAGCGA TGGCTGCATGTTTTGATGTTGGTGGGGTGTGGATTTTGCTGCCCAAGCG AGTGCCAAGCCACATCCCACCAAGCAACAAAAAAGTCGCCTGTGGTGG GTTGAAGAAAGGGAGAGAAAAAATGTGCAGCAGAACGAATGAGACAGC AGGGTCAAACAAAAGGGTTATTTACCTTCTCGAACTTCTCAATGGTACGC TGGTCGATACCACCGCACTTGTAGATCAAGTGACCTGTAATGTTATAGTC AGTTTCTGTGTGTAGTGTGTGGTGCCTGGCTAGTGGTATGTATATCTGGT GGCTGGCTTACCAGTAGTGGTGGATTTGCCGGAATCGACGTGGCCGATA ACGACCAAGTTAATGTGACTGGGCGTYSGTTTTTAMAA	T. menta
190226- 0091	GSYKGATCGGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAGCCA GCCACCAGATATACATACTAGCCAGGCACCACACACTACACAGAAA CTGACTATAACAATTACAGGTCACCTGATCTACAAGTGCGGTGGTATCGA	T. menta

	<p>CCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTTTTTTGAC  CCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTTTCTTCAA  CCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCAC  TCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCAGCC  ATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCARATTTGCTTTTT  TCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCRAARAG  TTGGGCAAGAAGTCTTCAAGTACGCTTGGGTTCTTGACAAGCTCAAGG  CCRAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTCGA  GACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCTTTC  CCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCGG  TCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCTGACT  GTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGGCTGGTAT  CTCCAAGGATGGGTCATARCKKKTYYCCTWGAA</p>	
IHEM 4203	<p>GGGGGWAACCCGGCCCCMRTCGAATTCCGRGCAATCCRSCACTACTGG  TAAGCCAKCCACGAGATATACATACTAGCCAGGCACCACACACTAC  ACAGAACTGACTATAACAATTACAGGTCACCTTGATCTACAAGTGCGGTG  GTATCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTT  TTTTGACCCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTT  TCTTCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCT  TGGCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACAT  GCAGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCARATTT  GCTTTTTTCTGTCTTCAGGGTTCRATGCTAACAAGGTACCTGTAGGAAGCC  RAAGAGTTGGGCAARAAGTCTTCAAGTACGCTTGGGTTCTTGACAAGC  TCAAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAA  GTTTCGAGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTA  CCTTTCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGC  CCCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAG  GCTGACTGTGCTATTCTCATCATTGCTGCCGGTACTTGGTGGAGTTCGA  GGYKGGTATYCTCCAAGGATGGGGTCATTAGCTGTTTTCKWGA</p>	T. menta
IHEM 10342	<p>CGYKAWCGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAGCCA  GCCACCAGATATACATACTAGCCAGGCACCACACACTACACACAGA  AACTGACTATAACATTACAGWTCACCTTGATCTACAAGTGCGGTGGTATCG  ACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGTGTTGA  CCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTTCTTCA  ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA  CTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATGCAGC  CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCTTTT  TTCTGTCTTCAGGGTTCGATGCTAACAAGGTACCTGTAGGAAGCCGAAGA  GTTGGGCAAGAAGTCTTCAATACGCCTGGGTTCTTGACAAGCTCAAG  GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTTCG  AGACCCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT  CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG  GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCCGA  CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTTCGAGGCTGGT  ATCTCCAAGGATGGGTCATAGCCYTGTTTTCTAAA</p>	T. menta
IHEM 584	<p>GSSKTAWTCGGGSMCGWTCGAATTCCGGMAATCCACCACTACTGGTA  AGCCAGCCACSAGATATACATACTAGCCAGGCACCACACACTACAC  ACAGAACTGACTATAACATTACYAGTCACTTGATCTACAAGTGCGGTGG  TATCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAARTAACCCTTTT  TTTGACCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTTCTCTCCCTTT  CTTCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTT  GGCACTCGCTTGGGCAGCAAATCCACCCCCACCAACATCAAACATG</p>	T. menta

	CAGCCATCGCTCCAGGCAACGATCGAGCCTCAKKGKCATGTTTCAGATTTG CTTTTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCG AAGAGTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCT CAAGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAA GTTTCGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTT ACCTTTCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGC CCCCGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAG GCCGACTGTGCTATTCTCATCATTGCTGCCGGTACTGGGTGAGTTCGAG GCTGGTATCTCCAAGGATGGGGTCATAGCCTKKTTYCCTGAA	
IHEM 620	GSSKTTATCGGSMCSGTCGATTCCGGSAATCCACCACTACTGGTARGC CAGCCACSAGATATACATAACCACTAGCCAGGCACCACACACTACACACA GAAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTGTTT GACCCTGCTGTCTCATTGTTCCGCTGCACATTTTTTTCTCTCCCTTTCTT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACACCCCAACATCAAATCATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATATTCAGATTTGCTT TTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAA GAGTTGGGCAAGAAGTCCTTCAAGTACGCCTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT CGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCT TTCCCTCCATCGTCTTGCTGTGCCGTAACGAGAGTAGACGCCCC CGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCA GACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGCTG GTATCTCCAAGGATGGGGTCATAGCTKKTTTTYCTGGA	T. menta
190129- 0017	CSKKWWWTCGGGSSMCGTCGATTCCGGCAATCCACCACTACTGGTAAG CCAGCCACCAGATATACATAACCACTAGCCAGGCACCACACACTACACAG AAACTGACTATAACAATTACAGGTCACCTTGATCTACAAGTGCCGGTGGTAT CGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTTTTT GACCCTGCTGTCTGTTTCGTTCTGCTGCACATTTTTCTCTCTCCCTTTCTT CAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGG CACTCGCTTGGGCAGCAAATCCACCCCAACATCAAAACATGCA GCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCARATTTGCTT TTTTCTGTCTTCAGGGTCRATGCTAACAAGGTACCTGTAGGAAGCCGAAR AGTTGGGCAAGAAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCTCAA GGCCRAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTC GAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCTT TCCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCC GGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGCTGA CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTCGAGGCTGGT ATCTCCAAGGATGGGGTCATAGCYKTTTTCCCTAAA	T. menta
190315- 0029	TGSYSSWWTCGGCMMGTTCGATTCCGGCAATCCACCACTACTGGGTAAG CCAGCCACCAGATATACATAACCACTAGCCAGGCACCACACACTACACAC AGAAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCCGGTGGTA TCGACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCTTTTGTT TGACCCTGCTGTCTCATTGTTCCGCTGCACATTTTTTTCTCTCCCTTTCT TCAACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTG GCACTCGCTTGGGCAGCAAATCCACACCCCAACATCAAAACATGC AGCCATCGCTCCAGGCAACGATCGAGCCTCATGTCATATTCAGATTTGCT TTTTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAA GAGTTGGGCAAGAAGTCCTTCAAGTACGCCTGGGTTCTTGACAAGCTCA AGGCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTT	T. menta

	<p>CGAGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTCTCTTTACCT  TTCCCCTCCATCGTCTTGCTGTGCCGTAACGAGAGTAGACGCCCC  CGGTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGCCG  ACTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTGAGGCTGG  TATCTCCMAAGGATGGGGTCATAGCCTKGTTTYCCTA</p>	
<p>190313- 0069</p>	<p>GKKGATCGGGCMCGTCGATTCCGGCAATCCACCACTACTGGTAAGCCA  GCCACCAGATATACATAACCACTAGCCAGGCACCACACACTACACACAGA  AACTGACTATAACATTACAGGTCAC TTGATCTACAAGTGCGGTGGTATCG  ACCAGCGTACCATTGAGAAGTTCGAGAAGGTAAATAACCCTTTTGTTTGA  CCCTGCTGTCTCATTTCGTTCCGCTGCACATTTTTTCTCTCCCTTTCTTCA  ACCCACCACAGGCGACTTTTTTTGTTGCTTGGTGGGATGTGGCTTGGCA  CTCGCTTGGGCAGCAAAATCCACCCCCACCAACATCAAAACATGCAGC  CATCGCTCCAGGCAACGATCGAGCCTCATGTCATGTTTCAGATTTGCTTTT  TTCTGTCTTCAGGGTCGATGCTAACAAGGTACCTGTAGGAAGCCGAAGA  GTTGGGCAAGAAGTCCTTCAAATACGCCTGGGTTCTTGACAAGCTCAAG  GCCGAGCGTGAGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTG  AGACCCCAAGTACAATGTCACCGTCATTGGTATGTTTTCTCTTTACCTTT  CCCCTCCATCGTCTTGCTGTGCCATAACTAACGAGAGTAGACGCCCCCG  GTCACCGTGACTTCATCAAGAACATGATCACTGGTACCTCCCAGGCCGA  CTGTGCTATTCTCATCATTGCTGCCGGTACTGGTGAGTTGAGGCTGGT  WTCYYCAAGGATGGGTCATAGCTGTTTCCTGAA</p>	<p>T. menta</p>

Table 13: Results of BT2 sequencing in *T. interdigitale* and *T. mentagrophytes*

Number	Sequence	ID
170824000 8	GGGGGAATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTCAC AACCTGAAGGGTA	T. inter
170428005 4	GGGGTGACTCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGAC TTGAACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTC ACTAACCTGAGGGT	T. inter
170410006 0	GGGGGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTACT GACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGAT CCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACTT GAACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCTCC AATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGAC CCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCA AAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTCACT CACCTTGGAGGGTA	T. inter
170314006 9	GGCGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTACTG ACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATC CGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACTTG AACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCTCCA ATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGACC CTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAA AAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCTC GATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAACG TCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTCACTA ACTTGAGGGTA	T. inter
171026000 6	GGGGGTATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC	T. inter

	CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT CACTTTGAGGGTA	
171026000 4	GGTGGTCTCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT	T. inter
171025008 1	GGTGGGCTCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT	T. inter
171026000 7	GGGGGGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT CACTTGAGGGTA	T. inter
171026000 9	GGGGGGAATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGAC TTGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCC GCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCA ACTAACCTGAGGGTA	T. inter
171026001 0	GGGGGGGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGAC TTGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG	T. inter

	CAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTC ACTAACCTGAGGGTA	
180925006 5	CCTGGGGCTCTGCGTTGCAGCATAATTGTATATTTTCGTGTGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGAC TTGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTC ACTCCCTGAAGGGTA	T. inter
161208006 5	GGGGGGATCTGCATTGCAGCATAATTGTATATTTTCGTGTGAGTTGTTAC TGACTTGGTTTACAGGCAAACCATTGCTGGTGAACACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTTCCGGTCTTGAGGGACT TGAACGTTGACAACTGGGATTTCTACAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTCACT CACCTTGAGGGTA	T. menta
180814002 9	GGGGGGGCTCTGCGTTGCAGCATAATTGTATATTTTCGTGTGAGTTGTT ACTGACTTGGTTTACAGGCAAACCTATTGCTGGTGAGCATGGTCTCGATG GATCCGGCCAGTGAGTGATTCTGCAAGAAAAAGTCCCGGTCTTGAGGGAC TTGAATGTTGACAACTGGGATTTCTACAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTC ACTCACCTTGAGGGTA	T. menta
180730002 3	GGGGAATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGAGTTGTTACT GACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGAT CCGGCCAGTGAGTGATTCTGCAAGAAAAAGTCCGGTCTTGAGGGACTT GAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCTCC AATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGAC CCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCA AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGGAACAACCTGGGCCAAGGGTCAC	T. menta
180604000 7	CGGGGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTGAGTTGTTACT GACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGAT CCGGCCAGTGAGTGATTCTGCAAGAAAAAGTCCGGTCTTGAGGGACTT GAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCTCC AATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGAC CCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCA AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT	T. menta

	CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGTCAC	
180209003 2	GGGGGGGAATCTGCATTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTT ACTGACTTGGTTTACAGGCAAACCATTGCTGGTGAACACGGTCTCGATG GATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTTCCGGTCTTGAGGGA CTTGAACGTTGACAACACTGGGATTTCTACAGCTACACCGGATCTTCTGACC TCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAA GCAAAAATACGTTCCCGGTGCGGTTCTTGTGATCTTGAGCCCGCCGC TCTCGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGAT AACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGT CACAA	T. menta
180925003 1	GGGGGTGCTAATGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTT ACTGACTTGGTTTACAGGCAAACACTATTGCTGGTGAACACGGTCTCGATG GATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGAC TTGAATGTTGACAACACTGGGATTTCTACAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCGGTGCGGTTCTTGTGATCTTGAGCCCGCCGC CTCGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGTC ACT	T. menta
IHEM 4268	GTGGGATCTGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTACT GACTTGGTTTACAGGCAAACACTATTGCTGGTGAACACGGTCTCGATGGAT CCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGACTTG AATGTTGACAACACTGGGATTTCTACAGCTACACCGGATCTTCTGACCTCCA ATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAAGACC CTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAA AAAATACGTTCCCGGTGCGGTTCTTGTGATCTTGAGCCCGCCGCCTC GATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATAACG TCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGTCAC	T. menta
190220- 0076	GGTGGGGCTCTGCATTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAACACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTTCCGGTCTTGAGGGAC TTGAACGTTGACAACACTGGGATTTCTACAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAATACGTTCCCGGTGCGGTTCTTGTGATCTTGAGCCCGCCGC CTCGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGTC ACTCACCTTTGAGGGTA	T. menta
190226- 0091	GGGGGGGAATTCTGCATTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTT ACTGACTTGGTTTACAGGCAAACCATTGCTGGTGAACACGGTCTCGATG GATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTTCCGGTCTTGAGGGA CTTGAACGTTGACAACACTGGGATTTCTATAGCTACACCGGATCTTCTGACC TCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAA GCAAAAATACGTTCCCGGTGCGGTTCTTGTGATCTTGAGCCCGCCGC TCTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGAT AACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACACTGGGCCAAGGGT	T. menta

	CACTA	
IHEM 4203	GGGGGGAATCTGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCTATTGCTGGTGAGCATGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGACT TGAATGTTGACAACTGGGATTTCTACAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT AACTGAGGGTTATCCAGCGTTTAGCCCTAAAGAGAGGCTCGCCGAACG GCTCTCCTGGGAGAGCGCGGCCCGCCGAGGCAACCGAGTAATGTAGAC AAGAATGGGGCGGTACGGCCGGCGCACATCTGCTCACCCCTGACGGA CGTTTGGCCCTATCGTGGGGGGCCAGTCTCCGGCCTGCGCGCTAATG ATCCTTCCGGAGGCCCTGGGGAAAAGG	T. menta
IHEM 10342	GGGGGGACTCTGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGAC TTGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAG CAAAAAATACGTTCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTC ACTCACCTGAGGGTA	T. menta
IHEM 584	GGGGGGGCTTATGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTT ACTGACTTGGTTTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATG GATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGA CTTGAACGTTGACAACTGGGATTTCTATAGCTACACCGGATCTTCTGACC TCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAA GCAAAAAATACGTTCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGC TCTCGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGAT AACGTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGT CACTAACTTTGAGGGTA	T. menta
IHEM 620	GGGGGGAATCTGCGTTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCTATTGCTGGTGAGCATGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGACT TGAATGTTGACAACTGGGATTTCTACAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGC AAAAAATACGTTCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGAAACAACCTGGGCCAAGGGTCACT CACTTGGAGGGTAA	T. menta
190129- 0017	GGGGGGGCTCTGCATTGCAGCATAATTGTATATTTTCGTGTCGAGTTGTTA CTGACTTGGTTTACAGGCAAACCATTGCTGGTGAACACGGTCTCGATGG ATCCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGAC TTGAACGTTGACAACTGGGATTTCTACAGCTACACCGGATCTTCTGACCT CCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG	T. menta

	ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGGCAAAGGCCTCAAG CAAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCT CTCGATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATA ACGTCGTCTTCGGTCAGTCTGGTGCCGGAACAACGGGCCAAGGGTC ACTAAACATGAGGGT	
190315- 0029	GAGGGTATCTGCGTTGCAGCATAATTGTATATTTTCGTGTTCGAGTTGTTAC TACTTGGTTTACAGGCAAACCTATTGCTGGTGAGCATGGTCTCGATGGAT CCGGCCAGTGAGTGATTCTGCAAGAAAAGTCCCGGTCTTGAGGGACTTG AATGTTGACAACCTGGGATTTCTACAGCTACACCGGATCTTCTGACCTCCA ATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGACC CTTCCCTTCAGCAGCATACTAACTCATTGGAGGGCAAAGGCCTCAAGCAA AAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCTC GATGCTGTCCGCGCCGGTCCTTTTCGGTCAGCTCTTCCGCCCCGATAACG TCGTCTTCGGTCAGTCTGGTGCCGGAACAACGGGCCAAGGGTCACTA	T. menta
190313- 0069	GCTGGGCTCTGCGTTGCAGCATAATTGTATATTTTCGTGTTCGAGTTGTTAC TACTTGGTTTACAGGCAAACCTATTGCTGGTGAGCACGGTCTCGATGGA TCCGGCCAGTGAGTGATTCTGCAAGAAAAGTTCCCGGTCTTGAGGGACT TGAACGTTGACAACCTGGGATTTCTATAGCTACACCGGATCTTCTGACCTC CAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAGA CCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGGCAAAGGCCTCAAGC AAAAAATACGTTCCCCGTGCGGTTCTTGTTGATCTTGAGCCCGCCGCTCT CGATGCTGTCCGCGCCGGTCCTTTTGGTCAGCTCTTCCGCCCCGATAAC GTCGTCTTCGGTCAGTCTGGTGCCGGAACAACGGGCCAAGGGTCACT AACCTGAGGGTACCCGACAACCTTCGTCTTCGGCCAGTCCGGTGCTGGTA ACAACGGGCCAAGGGTCACTACACTGAGGGTAAATTGGA	T. menta

Table 14: Results of ITS sequencing in *T. soudanense* and *T. violaceum*

Number	Sequence	ID
180410-0026	GGGTTTCCGCGCAGGCCGGAGGCTGGCCCCCACCATAGGGACCGAC GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT TGTCTACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGG GAGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCG CCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGT CTGAGCGTTTAGCAAGCACAATCAGTTAAAACCTTCAACAACGGATCTCT TGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGA ATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTC TGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAAG CCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGCGG GACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGGC GAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCA ATCTTTATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGG GATACCCGCTGAACTTAAGCATATCAATAAGCGGAGGAAAATTA AAAAAG GGGAGGCGGAGGCGGGCCCCACAATAGGACGATTTGTAAGGAGGAA CATAGTGGCCGCATTCGCCATTTTTTGTCTCTTCGCGGGTGCTGGGGG GCCCCCCCCCTGAGGGAAAACCCCCGGGGGCCTTTTGGGGGGCCTCG CCGAACCCCCCGGAAGAAAAAACAGAAAAATTTCTTGAAAACGTTACT GTAGGGTGT	T.soud
180410-0027	AGGTTTTCGCGCAGGCCGGAGGCTGGCCCCCACCATAGGGACCGACGT TCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTG TCTACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGGGA GAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCGCC CGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGTCT GAGCGTTTAGCAAGCACAATCAGTTAAAACCTTCAACAACGGATCTCTTG GTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAAT TGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCTG GCATTCGGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAAGCC CGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGCGGGA CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGGCGA ATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCAAT CTTTATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGGGA TACCCGCTGAACTTAAGCATATCAATAAGGGCGGGAGGAAATACGGGGA AGGGGGGGCGCGAGCTGGCCCCCAGATAGGAACTACTTTACAGGGTG GAGGGAGGGCCCCGCTACGCTCTTTTTTGTCTACTCCGCGGGTGCC GCGGGGCCCCCTCCCTGCAAGGAAAACGCCGGAGCCCTTCTGGGGG GCCTCGACCGCCCCCCCCCGGAGAAAAA AAAAAAAAAAATTTCTAAAAA CTGTGCGCTAAGGTTTGGGGGGAACAGTT	T.soud
180227-0075	GTTTTTCGCGCAGGCCGGAGGCTGGCCCCCACCATAGGGACCGACGTT CCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGT CTACCTACCCGGTTGCCTCGGCGGGCCCCCTTCTGGGGGCCTCGAGCC GGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGA GCTGTGAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACCTTCAACAA CGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAA GTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACAT TGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAA CCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTT CGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGG	T.soud

	CTTCCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGC CCTGGCCCAATCTTTATATATATATATATATCTTTTCAGGTTGACCTC GGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCAAAGGCGGAGG AAATGTCGGGGGGGGGGGGCGGCCGGTGGCCCCCAGATTGGGACGGGT GCGGGAGGGGTGAGCGGAGGTGGCCGCCATCCCCCTTTTTTTTTTTAC TTCCCCGTTGCCCGGGCCCTTGGGGGGGCTCACCCACCCCGCCGC GAAAAAAAAACAAAAAAATTTTGA AAAACTGTCTTCTAAGGTGTGAGG GCAAATAAATAAATTTCAAAGATCTTTGATTTGGGTGCGGAAAAAAAG GAAAGGGAAAAAAGGGGGAATTGCCAAAT	
180410-0028	AATTCGCGCGAGCCGGAGGCTGGCCCCCACGATAGGGACCGACGTTT CATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGTC TACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGGGAGA GCCGTCCGGCGGGCCCTTCTGGGGGCCTCGAGCCGGACCGCGCCCG CCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGTCTGA GCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAACGGATCTCTTGGT TCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTG CAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCTGGC ATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAGCCCG GCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGCGGGACG CGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGGCGAAT GGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCAATCT TTATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGGGATA CCCGCTGAACTTAAGCATATCAATAAGCGGGAAGAAAAGATCAAACGG GGGGGAGGGTGGCCCCCACGATAGGGACCGACTTTCCTCAGGGGGG AAAAAAAATGGCGGGCGTACCCCTCTTTTTGTTACTCACCGTTTGCCTC GGCGGGCCGCTCCCTGCCAAAAGCGTTTCGGGGGCCCTCTGGGGGCC TGAGCGGACCCCCCGGGAGACAAAACAAAAAAATTCTAAAAAGCGGT TGTGAAGGTTTGAGGGCCAGTGATTAATTTTCAAGGGTC	T.soud
180410-0033	TATTCGCGCAGGCCGGAGGCTGGCCCCCACGATAGGGACCGACGTT CCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGT CTACCTACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAGCC GGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGA GCTGTCACTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAA CGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAA GTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACAT TGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAA CCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTT CGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGG CTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGC CCTGGCCCCAATCTTTATATATATATATATATCTTTTCAGGTTGACCTC GGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCATAAGCGGGAGG AAAGCTCGGGACGCGGAGGCCCCACGCTGGCCCCACAATACGGACGAG TTCAGCAAGGGTGTGAGCAGAGTCCCCGCCATCGCCCCATTTTGTCTACT CACCGTTGCTCGCGGGCCCGTTCTGGGGGCTCACGGACACCCGGCG GAAGAAAACCAAAAAAATTTCTAAAGACTCTCGTCGCAGCGTGGGAGAG ACAATACTTAAATTTAAAACGAACATTGGTTTCGGCTGATAAAAAACACAAA GGAAAAATAATGGGGAATTGCAAAATCC	T.soud
180410-0037	TAATCGGCGCAGCCGGAGGCTGGCCCCCACGATAGGGACCGACGTTT CATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGTC TACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGGGAGA GCCGTCCGGCGGGCCCTTCTGGGGGCCTCGAGCCGGACCGCGCCCG CCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGTCTGA	T.soud

	<p>GCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAACGGATCTCTTGGT  TCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAATTG  CAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCTGGC  ATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAGCCCG  GCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGGCGGGACG  CGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGGCGAAT  GGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCAATCT  TTCTTTATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGG  GATACCCGCTGAACTTAAGCATATCATAAAGCGGGAGGAAAAGCTCCGA  ACGGGGGGCCGCACGCTGGCCCCCAGATAGGGACGACTTTCATCAGGG  GTGAGCAGAAGTGGCGGCGTACCCCCCTTTCTTGTCTCCACCGGTTG  CTCGGCGGGCCCTCCCTGCAAGGAAAGCCTCGGGGGCGCCCTCTG  GGGGGCCAGCGACACGCCCCCGAAGAAAAACAAGAAAAATCTTTAAA  ACTTTGCTCGTAGGGGGTAGAGGCAACATTT</p>	
<p>180410- 0017</p>	<p>GGCTTCGCGCAGCCGGAGGCTGGCCCCCAGATAGGGACCGACGTTG  CATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGTC  TACCTACCCGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAGCCG  GACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAG  CTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAAC  GGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAG  TAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATT  GCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAAC  CCCTCAAGCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTC  GGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGC  TTCCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCC  CTGGCCCAATCTTTATATATATATATATCTTTTCAGGTTGACCTCGGA  TCAGGTAGGGATAACCCGCTGAACTTAAGCATATCAAAGGCCGGAGGAA  AGCCGGGGAAGGGGGGGGGCCCAAGCGGGCCACACAATTCGACGAGT  TGAAAAGGGTGAGCAGAGTGCCCCCTTATGCCTTTTTTTGTCTCTCC  GGTGGCTGGCTGTCCCTTTGGGGGCTCACCCACCCCCCGAAAAAAA  AACAAAAAAATTTCTAAGCGCTTTCTTGAATGTTGGGGGGCCACGATAA  AATTTACAAGAACTTGGATGCGCGCAGAAAAAAGAAAAGAGAAAATTT</p>	<p>T.viol</p>
<p>180227- 0070</p>	<p>GGTGCTTGC GCGCAGCCGGAGGCTGGCCCCCAGATAGGGACCGAC  GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT  TGTCTACCTACCCGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGG  GAGAGCCGTCCGGCGGGCCCTTCTGGGGGCCTCGAGCCGGACCGCG  CCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGT  CTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAACGGATCTCT  TGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGA  ATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTC  TGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAG  CCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGGCGG  GACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGGC  GAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCA  ATCTTTATATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAG  GTAGGGATAACCCGCTGAACTTAAGCATATCAATAAGGCGGAAGAAATATT  CCTGCGCGGGCCCCCCCCGCCCCCCCCAAAAGGGACTAATTTTCATGGGG  GTGGAGCAAAGGGCGCCGCCCCCTTTTTTTGTCCCTCACCGGG  GGCGGGGGGGGCCCTCCCCAGAAAGGAAAAGCTCGGGCGCTCTT  TTGGGGGCCCGACCAACCCGCCGCCAAGAAAAACAAAAAAA</p>	<p>T.soud</p>
<p>180410- 0019</p>	<p>TGGTTTCGCGCAGGCCGGAGGCTGGCCCCCAGATAGGGACCGACGT  TCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTG</p>	<p>T.soud</p>

	<p>TCTACCTCACCCGTTGCCTCGGCGGGCCCCTTCTGGGGGCCTCGAGC  CGGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAG  AGCTGTCACTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACA  ACGGATCTCTTGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATA  AGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACA  TTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCA  ACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCTCCCT  TCGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCG  GCTTCCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCG  CCCTGGCCCAATCTTTATATATATATATATATATATATCTTTTCAGGTTGA  CCTCGGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCAATAAGGC  GGAGGAAACGCGATTACGCGCTGCCACGCCCCCCCCCACATGGG  GGACGAGTTTCATCAAGAGTGGGGAGACGTGCCCCCCCTCCCCCAT  TCTTGTCTCCTCACCCGTTGCCACCGGGGGCTTTCTGGGGGCTGAACC  CGCCCCCCCCCGAAGACAAAACCAAAAAAATTTTTTAAAACTTGCG  TTCGGGGGGGGGAACACAAATACAAAAAATTTACACGAAATTTTGGTTT  CGGCGCATAAAAAA</p>	
<p>180410- 0022</p>	<p>GGTGTTCGCGCAGGCCGGAGGCTGGCCCCCAGCAGTAGGGACCGAC  GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT  TGTCTACCTCACCCGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGG  GAGAGCCGTCCGGCGGGCCCCTTCTGGGGGCCTCGAGCCGGACCGCG  CCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGT  CTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACAACGGATCTCT  TGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGA  ATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTC  TGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAAG  CCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGCGG  GACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGGC  GAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCA  ATCTTTATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGG  GATACCCGCTGAACTTAAGCATATCATAAGGCGGGAGGAAAATGTGCA  CGGGGGGGGGGCCGGCCGCCCCCGAAAAGGGACCAAGTTCTTGGGGG  TGAGGGAAGTGGGCGCCTCCCCCTCATTCTTGTCTTCTCACCGGGTGG  CTGGGGGGCGCGCTCCCCAGCGGAGAAAACCACCGGGGGCCTTTCTG  GGGGGCCTCAGCGGAGCGCCCCGGGGAAGAACAACAAAAAATCTGGA  AACTGTGGCGGGAGCGTGGG</p>	<p>T.soud</p>
<p>180227- 0053</p>	<p>AGGGTTGGCGGCAGGCCGGAGGCTGGCCCCCAGCAGTAGGGACCGAC  GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT  TGTCTACCTCACCCGTTGCCTCGGCGGGCCCCTTCTGGGGGCCTCGA  GCCGGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGA  AGAGCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAA  CAACGGATCTCTTGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGA  TAAGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCA  CATTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTT  CAACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCC  CTTCGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATT  CGGCTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGC  CGCCCTGGCCCAATCTTTATATATATATATATATCTTTTCAGGTTGAC  CTCGGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCAATAAGGCG  GAGAGGACCAGGGGGCCACGCCGAAGCTCGCCCCGATAGGGGACG  GAGTTCATCGGGGGGGAGCAACCTGCACCGCGTACTCCCCTTCTGTCTC  CTCCCCGTTGGCTCGGGGGGGCCCTTCTGGGGGGCTCAGCCCGACG  CGCCCGCCGAAGAAAAACAAAAAATTTCTGAAAGACGGTCGTGCGGAG</p>	<p>T.soud</p>

	GGGGTTACAGCAATCATTTAAACTTTACACGAATCTTTGGGTGCGGCGTGA GAAAAAACACAAAGTGCATAATTAGGGAGAATTGCAGAATTGCGGGAA GTCACAAACGTTAAACATTTCTGGCATGTGCGTGGGGGTGCGTGTGAG ATTGTCCTCACCCCTGCTGTGAATGTGAAAAGCG	
180306- 0068	AGGTTTTGCGCGCAGGCCGGAGGCTGGCCCCCAGCATAGGGACCGACG TTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTT GTCTACCTCACCCGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGGG AGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCGC CCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCAAGTCT GAGCGTTTAGCAAGCACAATCAGTTAAAAACTTTCAACAACGGATCTCTT GGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAA TTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCT GGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAAGC CCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGGCGG ACGCGCCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGGCG AATGGGCAGCCAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCAA TCTTTATATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGG TAGGGATACCCGCTGAACCTAAGCATATCAATAAGGCGGAGAAGCACCT CTTTTGGGGGGCCCCCGCGGGCCCCACGATGGGGACGAGTTACATCG GGGGTGAGAGACCGGCGGCGTACTCCCCATTCGTGTCTACTACCGGG TGCGCGCGGGCCGCTCCCTACAAGGAGAGCATCGCGGGCCTTCTGGG GGCTCCGCGACCCCCCGCGAAGAACAACAAGAAAATTCAGAAGGGG TGATATGGGAGTCGTTAAACAACGATAAAAACTATAAAGTAATCTTGTGT GGTGCAAGAGAGCGCAAAGACGAATCAATAATGTGAAATGGCTGAAG TTCGGGAAACGCGGAACCTTACAA	T.soud
180621- 0047	AGGTTTTGCGCGCAGGCCGGAGGCTGGCCCCCAGCATAGGGACCGAC GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT TGTCTACCTCACCCGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGG GAGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCG CCCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCAAGT CTGAGCGTTTAGCAAGCACAATCAGTTAAAAACTTTCAACAACGGATCTC TTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTG AATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCT CTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAA GCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGGCG GGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGG CGAATGGGCAGCCAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCC CAATCTTTATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGG TAGGGATACCCGCTGAACCTAAGCATATCAATAAGCGGGAGAA	T.viol
180611- 0049	TGGGGTTGCGCGCAGGCCGGAGGCTGGCCCCCAGCATAGGGACCGA CGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT TTGTCTACCTCACCCGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAG GGAGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGC GCCCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCAAG TCTGAGCGTTTAGCAAGCACAATCAGTTAAAAACTTTCAACAACGGATCT CTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGT GAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCC TCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCA AGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGG GGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGG GCGAATGGGCAGCCAACCAGCGCCCTCAGGACCGGCCGCCCTGGCC CCAATCTTTATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGG	T.viol

	AGGGATACCCGCTGAACTTAAGCATATCAATAAGCGGAGGAA	
190118-0005	AGGGATTCGCGCGGGCGGAGCTGGCCCCCAGCATAGGGACCGACGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGTC TACCTCACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAGCCG GACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAG CTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAAC GGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAG TAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATT GCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAAC CCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTC GGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGC TTCCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCC CTGGCCCAATCTTTATATATATATATATATATATATCTTTTCAGGTTGACC TCGGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCAATAAGGCGG AGGAAATTTGTTACGCGCAGCGGGAGGCTGGCCACTATAGGGACGAC GTTTCATGAGGGGTGAGCAGAGTGCGCGCGTCTCCCCATTCTTGTCTAC TCACCGGTTGCGTGGGGGGTCCCTTCGGGGGCTCAGGGACGGCGCGG AAGAAAAACAAAAAAATTTCCGTGAGCTGTGGTGGGGCGTGTACAGCA ATAATTATAACTTTAAACGAATCTTTGGTGTGCGGCTCATGAAAAACAGCAA GGGATTATTATGTGTAATGTGGAAGTGCGGAATCTAACTTTAACTGGCT CTCGCTTCCGGGGGAGCGTGTGAGGGATTCCCTACCCCGGTGTTGG	T.soud
180625-0012	TGGGTTTTTCGCGCAGGCCGGGAGGCTGGCCCCCAGCATAGGGACCGA CGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT TGTCTACCTCACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAG GGAGAGCCGTCCGGCGGGCCCTTCTGGGGGCCTCGAGCCGGACCGC GCCCGCCGGAGGACAGACACCAAGAAAAATTCTCTGAAGGGCTGTCAG TCTGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATCT CTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGT GAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCC TCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCA AGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGGC GGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTTG GCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCC CCAATCTTTATATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAG GTAGGGATACCCGCTGAACTTAAGCATATCAATAAGCGGAGGAA	T.viol
180410-0021	GGGCTTCGGCGCGGACGGAGGCTGGCCCCCAGCATAGGGACCGACG TTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTT GTCTACCTCACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGGG AGAGCCGTCCGGCGGGCCCTTCTGGGGGCCTCGAGCCGGACCGCGC CCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGAGCTGTCAGTC TGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATCTCTT GTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAA TTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCT GGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAGC CCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGGCGGG ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGGCG AATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCAA TCTTTATATATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAG GTAGGGATACCCGCTGAACTTAAGCATATCAATAAGGCGGAGGAAATTT CGTCGCGCGGCCAAGCTGGCCCCCAAAGGGACGAGTTTCATCAGGG GTGAGCGACGTGGCGCCGTCCCCCATTCTTGTCTACTCACCCGGTTT GCTCGGGGGCCCTCCCTGCAGGGAAAACCCTCGGCGGCCCTTTC	T.viol

	GGGGGGCTTCACCAGACCGCCCCGGGAGAAAAACAAAAAAATCTCT AAGAAGTGTTCGTGGGAGGGTTTGGAGAAATCATTTAACTTATAAAAGAA TCCTTTGGTGTTCGCTCCTGAGAGACACAGCAAAGCCATAGGAAAGTGT GAAATGGGAGAATTCTGAAATCGCAAATTATAAAAATATCCGATGCGTG GGCGGGGGCGGGCGAGCCGCGCTCCCCTCCCCCCTGTGTGAT	
180227-0045	GGTTTTCGCGGCAGGCGGAGGCTGGCCCCCACGATAGGGACCGACGT TCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTG TCTACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCTGCCAGGGA GAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCGCC CGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCAGTCTG AGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATCTCTTG GTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAAT TGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCTG GCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAGCC CGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGGCGGGA CGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGGCGA ATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCAAT CTTTATATATATATATATATATATATATATCTTTTTCGGGTTGACCTCAGATC GTGTAGGGATACCCGCTGAACTTACGCATATCAATAAGCAGAAGAATTTT TTTCTTTCCCCCCCCCTCCCCGCCCCCGGGGAAGAAGGGTCTTACGG GGGGGGAGGAGGGGGGGCCGCATTCCCCCTTTTTTCTCCCCCCGGG GGGGGGCGGGGGGCCGCCCTCCCAGGAAGGAAAACCCCGCGCGGCTT CTTTTGTGGTCTCCACCTACCCCCCGGAAAAAAGAAATTTT TTGAGGGGTGGGGGGCTGGGGGTAGAACACACCACTAAAAACATAAAA AAAATCTTTGTTTTCCCTGCTGAAAAACAGAAGTACGAAAAGTCAATGC TGTTTTGTGAGAAAGGGGCAGAGCACCCCTCTTAGAAACATCCTAAAGCG CGGGGGGGCGGTGGGGGGCGCTCCTCCCCTCCCGCA	T.viol
180227-0044	TGGGTTTCCGCGGCGGCCGGGAGGCTGGCCCCCACGATAGGGACCG ACGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATT CTTGCTACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCTGCCA GGGAGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCG CGCCCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCA GTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATC TCTTGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATG TGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCC CTCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTC AAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGG CGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTG GGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGC CCCAATCTTTATATATATATATATATATATATATATCTTTTCAGGTTGACCT CAGATCAGGTAGGGATACCCGCTGAACTTAAACATATCAATAAGGGGGA AGAA	T.viol
180420-0056	GGGTTTCGCGCAGGACGGAGGCTGGCCCCCACGATAGGGACCGACG TTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTT GTCTACCTACCCGGTTGCCTCGGCGGGCCGCGCTCCCCTGCCAGGG AGAGCCGTCCGGCGGGCCCCCTTCTGGGGGCCTCGAGCCGGACCGCGC CCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCAGTCT GAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATCTCTT GGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTGAA TTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCTCT GGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCAACCCCTCAAGC CCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGGCGGG	T.viol

	<p>ACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGGCG  AATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCCCAA  TCTTTATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGGG  ATACCCGCTGAACTTAAGCATATCAATAAGGCGGAGGAAGGATGAAGCG  CGGCCCGAAGCTGGCCCCACAATAGGGGACGACGTTTCATCAGGGTGA  GCGACGTGCGCCGGCGTACTCTCCATTCTTGTCTACCTCACCGGTTTG  CTCGGCGGGCGCGCTCCCTGCAAGGAAAAGCCGCGGGGGCCCTTC  TGGGGGGCTCAGCGGACGCCCCCGGAAGGAAAACCCAAGAAAATTTT  CTGAAGGGCGGGTGTGTTGAGCTTTTGAAGCAACCGTTTAAAAATTTCAAC  GGATCTTGGGATTCTGCTTCGTGAAAAACGCAAGAGGGGAAAAGAAAAGG  AGAGAGTGAAAATCTGGGAAAAGAAAATTTAAATAGCCCTGCTTGGG  GGGTGGGG</p>	
<p>180611- 0016</p>	<p>GGGGTTTCCGCGCGGCCGGAGGCTGGCCCCCACGATAGGGACCGAC  GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT  TGTCTACCTCACCCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAGG  GAGAGCCGTCCGGCGGGCCCTTCTGGGGGCTCGAGCCGGACCGCG  CCCGCCGGAGGACAGACACCAAGGAAAATTCTCTGAAGGGCTGTCACT  CTGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAACAACGGATCTC  TTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTG  AATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCT  CTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAA  GCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCCTTCGGGGGCG  GGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCCTGGG  CGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCC  CAATCTTTATATATATATATATATATCTTTTCAGGTTGACCTCGGATCAGG  TAGGGATACCCGCTGAACTTAAGCATATCAATAAGGCGGGGAGAAAAT  GGGAAGGCGCAGGCCGGAGGCGGGCCCCCGATAGGGACGACTTTCA  TCAGGGTGAGCGAGTGGCCGGCCGTACCCCCATTCTTGTCTACTTACC  GGGGTGCCTCGGGGCCGCTCCCGGCAAGGAAAACCCCGGCGGCC  CCTTTTGGGGCCAGCGGACCCCGCCGGGAGAGAAAACAAAAGAAAAT  TTTTGAGAGGGTTGGCAGTTGTAGCGTGGGGAGACACAGATTTAAAAT  TTACCGAATCTTAATTTGCGCGCCGGGAAAAAAAAGAAAAGGCAGAAAA  AGGGGAATTGAAAATGGGGAAATAAAAAATGTTAAAAGCTCCTGAATC  GCGCGGGGGC</p>	<p>T.viol</p>
<p>190118- 0006</p>	<p>GGTTTTCGCGCATGCCGGGAGGCTGGCCCCCACGATAGGGACCGACG  TTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTT  GTCTACCTCACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAG  CCGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAA  GAGCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACTTTCAAC  AACGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGAT  AAGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCAC  ATTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTT  AACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCC  TTCGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCC  GGCTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCC  GCCCTGGCCCAATCTTTATATATATATATATATATCTTTTCAGGTTGA  CCTCGGATCAGGTAGGGATACCCGCTGAACTTAAGCATATCAATAAGCG  GAGGAA</p>	<p>T.soud</p>
<p>190118- 0012</p>	<p>AGGGTTCGCGCAGCCGGAGGCTGGCCCCCACGATAGGGACCGACGTT  CCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTGT  CTACCTCACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAGCC  GGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTCTCTGAAGA</p>	<p>T.soud</p>

	<p>GCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACCTTTCAACAA  CGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAA  GTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACAT  TGCGCCCTCTGGCATTCCGGGGGGGCATGCCTGTTGAGCGTCATTTCAA  CCCCCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTT  CGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGG  CTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGC  CCTGGCCCCAATCTTTATATATATATATATATATATATCTTTTCAGGTTGACC  TCGGATCAGGTAGGGATAACCCGCTGAACTTAAGCATATCAATAAGGCGG  GAGGAAAGCTATTAACGCGCAGGCCGAAGGCTGGCCCCACAATGGGA  CGGAGTTCCATCAGGGGTGAGCAGACGTGCGCGCCGTACGCCTCATT  TTGTCTACTCACCGGTTGCCTCGGCGGGGCCCTTCTGGGGGGCTCAGC  CGACGCGCCGCAAGAAAAACAAAAAAATTTCTGAAGAGCTCTC  GTCGGAGGGTTTACAGCAATATTAATAATTTTACAGGGATCTGTGGCTTCG  CGTCGTGAAAAACAGGAATGCAATAATTAATGGGAATGGAAAATTGCG  GAGATAAAAAATTGGAAACATGTGTGCGGTGCATTGAGGGGGGGGGCGGG  TGGAGTGATTTCTCACGCGCGTGTGGGAAAGGAGAAAACGCCGCCCTCCT  CTCGTGGGGCGCGAGCACACAGTG</p>	
<p>IHEM 13492</p>	<p>CGGGTTTGC GCGCAGGACGGAGGCTGGCCCCCACGATAGGGACCGA  CGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATT  TTGTCTACCTCACCGGTTGCCTCGGCGGGCCGCGCTCCCCCTGCCAG  GGAGAGCCGTCCGGCGGGGCCCTTCTGGGGGCCTCGAGCCGGACCGC  GCCCGCCGAGGACAGACACCAAGAAAAATTCTCTGAAGAGCTGTGAG  TCTGAGCGTTTAGCAAGCACAATCAGTTAAAACCTTTCAACAACGGATCTC  TTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATAAGTAATGTG  AATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCACATTGCGCCCT  CTGGCATTCCGGGGGGGCATGCCTGTTGAGCGTCATTTCAACCCCTCAA  GCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCTTCGGGGGCG  GGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCGGCTTCTGGG  CGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCGCCCTGGCCC  CAATCTTTATATATATATATCTTTTCAGGTTGACCTCGGATCAGGTAGGGA  TACCCGCTGAACTTAAGCATATCAATAAGCGGAGGAAACGATAACGCCA  GGCGGAAGCGGGCCCCCGATAGAGACCGACTTCATCAGGGGTGAG  CAACGTGCGCCGCCGTAGCCATTCTTGTCTCTCACCGGTTGCCTGGCG  GGCCGGCTCCCCGGCAGGGAAACCTCGCGGCCCTTCGGGGGGCCCCG  CCGCACCCGCCCCCGGAGAAAAACCAAAAAAATTTCTAAAAATGTCTCT  GACGTTTTACGGCAACCGTTTAAAATTTTACAGGAATCT</p>	<p>T.soud</p>
<p>180611- 0069</p>	<p>GGGGTTCCGCGGCGGCGGAGGCTGGCCCCCACGATAGGGACCGAC  GTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCT  TGTCTACCTCACCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGA  GCCGGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAATTCTCTGA  AGAGCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAAACCTTTCAA  CAACGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGA  TAAGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCA  CATTGCGCCCTCTGGCATTCCGGGGGGGCATGCCTGTTGAGCGTCATTT  CAACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCC  CTTCGGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATT  CGGCTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGC  CGCCCTGGCCCCAATCTTTATATATATATATATATATCTTTTCAGGTTGAC  CTCGGATCAGGTAGGGATAACCCGCTGAACTTAAGCATATCAATAAGGCG  GAAAAGAACCAGGGGGCGCCCCCGCGGAGGGCGGCCCCACCATGG  GGGACGACGTTTCATCAGGGGTGGGGAGACCGCACCGGCGTACTCCCA  TTCTTGTCTCTCACCGGTTGCTCGGGGGGGCTCTTCTGGGGGCTCG</p>	<p>T. Soud</p>

	<p>AGCGGACGCGCCGCGGGAGAAAAAACAAAAAATTTCTGAAGACTGTA  GTTGAGGTGTACAGACAATATTTAATACTTCACAGGAACATTTGCGTCCG  CTTGAGAAAAACCACGAAAGTGAAAATTAAGGTGAATTTGAAAATCCTGA  AACAGAAAACTGTGACACATTGCCGCTGGGATTGGAGAGGGGTGCGGTT  GAGTAGGTGTACCCCTCGCTCGTGTGAATGAAGACGTCGTCCTCTTCTG  GGTGTGGACGACAAAGAAAAGCACCGAGCAATAGTACTGGAAATAAGC</p>	
<p>180611- 0017</p>	<p>AGGGCTTCGCGCAGCCGGAGGCTGGCCCCCACGATAGGGACCGACG  TTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCCATTTCTT  GTCTACCTCACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCGAG  CCGACCCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTTCTCTGAA  GAGCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAAC  AACGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGAT  AAGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGCAC  ATTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATTTT  AACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTCCC  TTCGGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCC  GGCTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCC  GCCCTGGCCCAATCTTTATATATATATATATATATCTTTTCAGGTTGACC  TCGGATCAGGTAGGGATAACCCGCTGAACTTAAGCATATCAATAAGGCGG  AGGAGAAGTGAAGTGCACGCGCGAAGCTGGCCCCCACGATAGGGAC  GAGTTTCATCAGGGTGAAGACGTCGCCGGCGTCCCCCATTTCTTGTCTA  CTCACCGTTGCTCGCGGGCCCTTCTGGGGGCTGAGCCGACGCGCCG  CGGAAGAAAACAGAAGAATTCTCTAAGAGCTCTCGTCGAGGCGTGTGG  ACAGCAATCATATAAAATTTACACGATCTTTTGGGTTGCGCTTCGATGA  AAAAGCACAAAAGGCGATAATAATGGTGATTTGAGAAGTCTGGGATACG  AAATCTTTAGAGTATTGCCTCGCATTTTCGGAGGGATGCGTGCAGGTATTT  ATCTCACGCGTTGGGTGGAGAGAGGCTCCGCACTCTGGGGGCGGTGAC  GCAAAAAAATGGCGGCGATATCTGTTTCGTGAATGGAGCGACAAGCAG  CCTCAA</p>	<p>T. Soud</p>
<p>181212- 0075</p>	<p>GGTGCTGCGCGGCAGGCCGGAGGCTGGCCCCCACGATAGGGACCGA  CGTTCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCCATTC  TTGTCTACCTCACCCGGTTGCCTCGGCGGGCCCTTCTGGGGGCCTCG  AGCCGGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAAATTTCTCTG  AAGAGCTGTCAGTCTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCA  ACAACGGATCTCTTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCG  ATAAGTAATGTGAATTGCAGAATTCCGTGAATCATCGAATCTTTGAACGC  ACATTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTGAGCGTCATT  TCAACCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCTC  CCTTCGGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATT  CCGGCTTCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGG  CCGCCCTGGCCCAATCTTTATATATATATATATATATCTTTTCAGGTTGA  CCTCGGATCAGGTAGGGATAACCCGCTGAACTTAAGCATATCAATAAGGC  GGAGAAGAACGAGGACGCGCACGCCGGAGGCTGGCCCCACGATAGGG  GACGACGTTTCATCAGGGGTGAGCAGAGTGCCCGGCCGTACGCCCATTT  CTTGTCTACCTCACCCGGTTGCTCGGCGGGCGCTTCTGGGGGCTCAGC  CGGACGCGCCGCAAGAAGAACAATAAATCTTGAAGAGCGTCGTCGA  GGGGTTACAGCAATATTTAACTTACACGATCTCTGGGTTGCGCTCATG  AAAAAGCAGCAAGGCGATAAATAATGGGAGTTGCAAATTCGGAACGC  AACTGGAACCATGTCTCTGACATTCCGGGAGGGAGCGGTCAAATAAGTA  CCTCAGTCGCGTGGTTGATGGAGAAGTCGCCTCCTCTGGGTGAGACGG  CAGAAAGAAGTGACGGGCGCAATACGCTCCTGGTTAGGAGAGAGGCAC  GGCCTGACAGGCTCTGTGCCCACTAA</p>	<p>T. Soud</p>

181212-0074	GGGGCTTCGCGCGGGCGGAGGCTGGCCCCCACGATAGGGACCGACGT TCCATCAGGGGTGAGCAGACGTGCGCCGGCCGTACGCCCCATTCTTG TCTACCTCACCCGTTGCCTCGGCGGGCCCCTTCTGGGGGCCTCGAGC CGGACCGCGCCCGCCGGAGGACAGACACCAAGAAAAATTCTCTGAAG AGCTGTCACTGAGCGTTTAGCAAGCACAATCAGTTAAACTTTCAACA ACGGATCTCTGGTTCCGGCATCGATGAAGAACGCAGCGAAATGCGATA AGTAATGTGAATTGCAGAATTCGGTGAATCATCGAATCTTTGAACGCACA TTGCGCCCTCTGGCATTCCGGGGGGCATGCCTGTTTCGAGCGTCATTTCA ACCCCTCAAGCCCGGCTTGTGTGATGGACGACCGTCCGGCCCCCTCCCT TCGGGGGCGGGACGCGCCCGAAAAGCAGTGGCCAGGCCGCGATTCCG GCTTCCTGGGCGAATGGGCAGCCAAACCAGCGCCCTCAGGACCGGCCG CCCTGGCCCCAATCTTTATATATATATATATATATCTTTTCAGGTTGACCT CGGATCAGGTAGGGATACCCGCTGAACCTAAGCATATCAATAAGCGAGA AGAGAAGCCCGTAGGCGCGGGCGGAAGGGGGCCCCCATGATGGGGGCGA GTTTTACGGGGGGAGCAGAATGCCCGCCCCCCCCCTTTCTTGTCT ACTCCCCGGGTTGCTTGGGGCGCCCTTCTGGGGGGCTCAGCCGCCG GCGCCCCGAAAAAAAAAAAAAAAAAATTTTTAGGACTGTCATCTGAGGG TGTGCCACCAATCATTTTAAATTTACACGAATTATGGGTTCCGCTCGTG AAAAACGAGACAGGGATGAAATAGTGTGAAGTGAATATGCGTGAATATA AATTTGAACCTTGCCCTGGCTTTGGGAGGGGGGCGCGGCCGAGCTGTT TCCCCCGCGCCTGTGGTGTGATGAAGCAGCGCGCCCCCTCCTCGGTG GGGGGACGCCACAAAAAATAGGCCGGGCGCTCGCCTCTTTGTGGAG AGGGGGGCACCAACGCCCGCGCGCACCGCCCTC	T. Soud
-------------	--	------------

Table 15: Results of Tef-1 $\alpha$  sequencing in *T. soudanense* and *T. violaceum*

Number	Sequence	ID
180410-0026	TKGTSKGWATCGGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAA GCCAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGA CTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGC GTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTG CTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGA AATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCA AAATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAAC GATCGAGCCTCATGTTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGTCCACCGTGACTTCATCAAGAACATG ATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCYTGT TTCCT	T.soud
180410-0027	TGAYGTTATCGGGCMACGTCGATTCCGGCAAATCCACCACTACTGGTAA GCCAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGA CTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGC GTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTG CTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGA AATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCA AAATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAAC GATCGAGCCTCATGTTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGTCCACCGTGACTTCATCAAGAACATG ATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGT TTCCTGAA	T.soud
180227-0075	TGTYGTATCGGCMCRTCGATTCCGGCAAATCCACCACTACTGGTARGCC AGCCACSAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACTA TAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA CCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCTG TCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAAT TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA TCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT CGAGCCTCATGTTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCTA ACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAGT ACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCAC CATCGATATCGCCCTCTGGAAGTTCGAGACCCCCAAGTACAATGTCACC GTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCATATCT AACGAGAGTAGACGCCCCCGTCCACCGTGACTTCATCAAGAACATGATC ACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGTA	T.soud

	CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGTTTCCTGA	
180410-0028	TKGTKGTATCGGCMCGTCGATTCCGGCAAATCCACCACTACTGGTAAGC CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT ATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCGACCAGCGT ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT GTCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGTTT CCTGA	T.soud
180410-0033	TGAKGCTATCGGCMCGTCGATTCCGGCAAATCCACCACTACTGGTAAGC CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT ATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCGACCAGCGT ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT GTCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGTTT CCTGAA	T.soud
180410-0037	TGAYGAWTCGSGYMCGTCKATTCCGGCAAATCCACCRCTRCTGGTARG CCRGCCACCAGAATACCTCTAGCCAGGCACCGAATTACACAGAACTGA CTATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCGACCAGC GTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTG CTGTCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGA AATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCA AATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAAC GATCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATG ATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTAAGTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTKT TTCCTGA	T.soud
180410-	AGGSKGWWATCGGCMACGTTCGATTCCGGCAAATCCACCACTACTGGT	T.viol

0017	<p>AAGCCAGCCACCSAGATACCTCTAGCCAGGCACCGAATTACACAGAACT  GACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCA  GCGTACCATTGAGAAGTTGAGAAGGTAATAACCCCCCTTTTTTGACCC  TGCTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGT  GAAATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAG  CAAATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCA  ACGATCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGA  TGCTAACAAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTT  CAAGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGT  ATCACCATCGATATCGCCCTCTGGAAGTTGAGACCCCCAAGTACAATG  TCACCGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACC  ATATCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAAC  ATGATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGC  CGGTACTGGTGAGTTCGAGGCTGGTATCTCCMAGGATGGGTTCATAGCYT  GTTTCCYTA</p>	
180227-0070	<p>TKKKGTAATCGGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAG  CCAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGAC  TATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCG  TACCATTGAGAAGTTGAGAAGGTAATAACCCCCCTTTTTTGACCCTGC  TGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGTGAA  ATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAA  AATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACG  ATCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGC  TAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAA  GTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATC  ACCATCGATATCGCCCTCTGGAAGTTGAGACCCCCAAGTACAATGTCA  CCGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATAT  CTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGA  TCACTGGTACCTCCCAGCTGACTGCGCTATTCTCATCATTGCTGCCGGTA  CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTTCATAGCYTGTTT  CTGAA</p>	T.soud
180410-0019	<p>TGAKGTAATCGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAGC  CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT  ATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGT  ACCATTGAGAAGTTGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT  GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGTGAAA  TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAA  ATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA  TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT  AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG  TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA  CCATCGATATCGCCCTCTGGAAGTTGAGACCCCCAAGTACAATGTCAC  CGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATATC  TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT  CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT  ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTTCATASCYTGTTT  YCYWAA</p>	T.soud
180410-0022	<p>TGCYGTWTCGGCMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAGC  CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT  ATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGT  ACCATTGAGAAGTTGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT  GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGTGAAA</p>	T.soud

	TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGTTT CCTAAA	
180227-0053	TGACGCATCGCTGYTTCTGTGGGATCTCTCCKGGCTGGTTCATGACTGT TTACGAAATACCKTAGSYAGGYRCCGAATTACACAGAAACTGACTATAA CATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTACC ATTGAGAAGTTCGAGAAGGTAATAACCCCTTTTTTGGACCCTGCTGTC TCCGTTCTGTTGCACAATTTTCCCCTTCATCCACTACAGGTGAAATTTT GGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAATC CACACCCCAACATCAAACATGCAGCCATCGCTCCAGGCAACGATCG AGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCTAAC AAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAGTAC GCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCACC TCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCACCGT CATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTACCATATCTAA CGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGATCAC TGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGTACT GGTGAGTTCGAGGCTGGTATCTCCAARGATGGGTCATAGCTGTTTCTG A	T.soud
180306-0068	GCGTACGCRTGMAATCTRRCYGATCTCTCCAGGCTGGTGCATGACTGT TTACGAGATACCTCTAGGCAGTCACCGAACTACACACAGAAACTGACTAT AACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA CCATTGAGAAGTTCGAGAAGGTAATAACCCCTTTTTTGGACCCTGCTG TCTCCGTTCTGTTGCACAATTTTCCCCTTCATCCACTACAGGTGAAAT TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA TCCACACCCCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT CGAGCCTCATGTCATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATG ATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCTGTT TCCCTGAA	T.soud
180621-0047	AYGGCCTCGAACTCACCAGTACCGGCAGCAATGATGAGAATAGCGCAGT CAGCCTGGGAGGTACCAGTGATCATGTTCTTGATGAAGTCACGGTGACC GGGGGCGTCTACTCTCGTTAGATATGGTACAACCACATGAGGGAACAAG GCAAAGAAACATACCAATGACGGTGACATTGACTTGGGGGTCTCGAAC TTCCAGAGGGCGATATCGATGGTGATACCACGCTCACGCTCGGCCTTGA GCTTGTCAAGAACCAAGCGTACTTGAAGGACTTCTTGCCCAACTCTTCG GCTTCCTACAGGTACCTTGTAGCATCGATCTTGAGACAGAAAAAAGCAA ATCCAAACATGACATGAGGCTCGATCGTTGCCTGGAGCGATGGCTGCAT GTTTGATGTTGGTGGGGTGTGGATTTGCTGCCCAAGCGAGTGCCAAGC	T.viol

	CACATCCCACCAGCAGCACCAAATTTACCTGTAGTGGGATGAAGGGG GAAAATTGTGCAACAGAACGGAGACAGCAGGGTCAAAAAAGGGGGTTA TTTACCTTCTCGAACTTCTCAATGGTACGCTGGTCGATACCACCGCACTT GTAGATCAAGTGACCTGTAATGTTATAGTCAGTTTCTGTGTGTAGTTCCG TGA CTGGCTAGAGGTATCTGGTGGCTGGCTTACCAGTAGTGGTGGATTT GCCGGAATCGACGTGGCCGATAACGACCAAGTTAATGTGACTGGCGTY CGTTTTACA	
180611- 0049	GGCWTYGGGCMGTCGATTCCGGCAATCCACCACTACTGGTAAGCCAG CCACCAGATACCTCTAGCCAGTCACCGAACTACACACAGAACTGACTAT AACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA CCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCTG TCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGAAAT TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA TCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT CGAGCCTCATGTATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGTCAACCGTACTTCATCAAGAACATG ATCACTGGTACCTCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGT TTTTCTGAA	T.viol
190118- 0005	GYGTTTTCGGGCRSWTCGATTCCGGCAATCCACCACTACTGGTARGCCA KCCACSAGATACCTCTAGGCAGGCRCCGAATTACACAGAACTGACTAT AACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA CCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCTG TCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGAAAT TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA TCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT CGAGCCTCATGTATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCTA ACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAGT ACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCAC CATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCACC GTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCATATCT AACGAGAGTAGACGCCCCCGTCAACCGTACTTCATCAAGAACATGATC ACTGGTACCTCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCYTGT TTTT CCTGAA	T.soud
180625- 0012	TGYKKTWWYGGCMSGTCGATTCCGGCAATCCACCACTACTGGTAAGCC AGCCACCAGATACCTCTAGCCAGTCACCGAACTACACACAGAACTGAC TATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCG TACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGC TGTCTCCGTTCTGTTGCACAATTTCCCCCTTCATCCCACTACAGGTGAA ATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAA AATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACG ATCGAGCCTCATGTATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCGAT GCTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTC AAGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTA TCACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGT CACCGTCATTGGTATGTTTCTTTGCCTTGTTCCTCATGTGGTTGTACCA TATCTAACGAGAGTAGACGCCCCCGTCAACCGTACTTCATCAAGAACA	T.viol

	TGATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCC GGTACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTG TTTCCTAAA	
180410-0021	TGGCGTAATCGCGYMCKTCKATTCCGGCAATCCACCRCTACTGGTAAGC CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT ATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCGACCAGCGT ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCCAACAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGTTT CCTWAA	T.viol
180227-0045	GSYGTAATCGGYMMSKTCGATTCSGGCAAATCCACCACTACTGGTAAGC CAGCCACSAGATACCTCTAGCCAGTCACCGAACTACACACAGAACTGA CTATAACATTACAGGTCAAYTTGATCTACAAGTGCGGTGGTATCGACCAGC GTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTG CTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGA AATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCA AAATCCACACCCCAACAACATCAAACATGCAGCCATCGCTCCAGGCAAC GATCGAGCCTCATGTCATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCG ATGCTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCT TCAAGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGG TATCACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAAT GTCACCGTCATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTAC CATATCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAA CATGATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTG CCGGTACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCT KGTTCCTAGA	T.viol
180227-0044	GSSGTATCGGYMCRATCKATTCCGGCAATCCACCACTACTGGTAGRCCA GCCACSAGATACCTCTAGCCAGTCACCGAACTACACACAGAACTGACT ATAACATTACAGGTCACTTGATCTACAAGTGCGGTGGTATCGACCAGCGT ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCCAACAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCGATG CTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCA AGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTAT CACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTC ACCGTCATTGGTATGTTTCTTTCCTTGTCCCTCATGTGGTTGTACCATA TCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATG ATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCG GTAAGTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCCTGT TTCCTWAA	T.viol

180420-0056	<p>GSYYKGWATYGSSYMMRRATCGKATWCCGRGSRRATCCACCACTRYTG  SMTARRCCAGCCACSAGATACCTCTAGCCAGTCACCGAACTACACACAG  AAACTGACTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATC  GACCAGCGTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTT  GACCCTGCTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTA  CAGGTGAAATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTG  GGCAGCAAATCCACACCCCACCAACATCAAACATGCAGCCATCGCTCC  AGGCAACGATCGAGCCTCATGTGATGTTTGGATTTGCTTTTTTCTGTCTC  AAGATCGATGCTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAG  AAGTCCTTCAAGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTG  AGCGTGGTATCACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAA  GTACAATGTCACCGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTG  GTTGTACCATATCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCA  TCAAGAACATGATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATC  ATTGCTGCCGGTACTGGTGAGTTCGAGGCTGGGTATCTYCCARGGATGG  GGTCATAGCTKGTTTTYCCTAG</p>	T.viol
180611-0016	<p>GGGTTTCGGMGMCCAATCGATTCCGATCTATCCAGCTGTACTGKAAAGC  CAKCCACGAGATACCTCTAGGCAGTCACCGAACTACACACAGAACTGA  CTATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGC  GTACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTACCCTG  CTGTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGA  AATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCA  AAATCCACACCCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAAC  GATCGAGCCTCATGTGATGTTTGGATTTGCTTTTTTCTGTCTCAAGATCG  ATGCTAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCT  TCAAGTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGG  TATCACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAAGTACAAT  GTCACCGTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTAC  CATATCTAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAA  CATGATCACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTG  CCGGTACTGGTGAGTTCGAGGCTGGGTATCTCCAAGGATGGGTATAGC  YTGTTTTCTWCAA</p>	T.viol
190118-0006	<p>GSKTAWTYGGGMMMSGTTCGATTCCGGCAATCCACCACTACTGGTAAGCC  AGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACTA  TAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA  CCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTACCCTGCTG  TCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAAT  TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA  TCCACACCCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT  CGAGCCTCATGTGATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCTA  ACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAGT  ACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCAC  CATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAAGTACAATGTCACC  GTCATTGGTATGTTTCTTGCCTTGTCCCTCATGTGGTTGTACCATATCT  AACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGATC  ACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGTA  CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTATAGCCTKGTTC  CTGAA</p>	T.soud
190118-0012	<p>GCSGTWYGGGSMCGWTTCGATTCCGGCAATCCACCACTACTGGTARGC  CAGCCACSAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT  ATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGT  ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTACCCTGCT</p>	T.soud

	GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCYKGT TCCTGAA	
IHEM 13492	GGCSGTATYGGGGRSRRTCGATTCCGGCAATCCACCACTACTGGTAAGC CAGCCACSAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACT ATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGT ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAA TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA ATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA TCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT AACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC CGTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATATC TAACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGAT CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCTKGT CCTAA	T.soud
180611- 0069	GSGWWTCGGGCMCGGTGCGATTCCGGCAATCCACCACTACTGGTAAGCC AGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGACTA TAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCGTA CCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCTG TCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAAAT TTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAAA TCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACGAT CGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCTA ACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAGT ACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCAC CATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCACC GTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATATCT AACGAGAGTAGACGCCCCCGGTCACCGTGACTTCATCAAGAACATGATC ACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGTA CTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCYTGTTC CTGAA	T. Soud
180611- 0017	AKGYGGWWCGGGSMSGTCGATTCCGGCAATCCACCACTACTGGTAAG CCAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAACTGAC TATAACATTACAGGTCACCTTGATCTACAAGTGCGGTGGTATCGACCAGCG TACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGC TGCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCACTACAGGTGAA ATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAA AATCCACACCCACCAACATCAAACATGCAGCCATCGCTCCAGGCAACG ATCGAGCCTCATGTCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGC	T. Soud

	<p>TAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAA  GTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATC  ACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCA  CCGTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATAT  CTAACGAGAGTAGACGCCCCGGTCACCGTGACTTCATCAAGAACATGA  TACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGG  TACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCYTKTTT  TCCTGG</p>	
<p>181212- 0075</p>	<p>GKKKGWWTYGGGSMCGTTCGATTCCGGCAAATCCACCACTACTGGTAAG  CCAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAAACTGAC  TATAACATTACAGGTCACCTTGATCTACAAGTGCCGGTGGTATCGACCAGCG  TACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGC  TGCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGTGAA  ATTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAA  AATCCACACCCCAACATCAAACATGCAGCCATCGCTCCAGGCAACG  ATCGAGCCTCATGTGCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGC  TAACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAA  GTACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATC  ACCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCA  CCGTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATAT  CTAACGAGAGTAGACGCCCCGGTCACCGTGACTTCATCAAGAACATGA  TACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGG  TACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATAGCTGTTT  TCCTGAA</p>	<p>T. Soud</p>
<p>181212- 0074</p>	<p>GSKKWWTCGGGCMGGTCGATTCCGGCAAATCCACCACTACTGGTAAGC  CAGCCACCAGATACCTCTAGCCAGGCACCGAATTACACAGAAACTGACT  ATAACATTACAGGTCACCTTGATCTACAAGTGCCGGTGGTATCGACCAGCGT  ACCATTGAGAAGTTCGAGAAGGTAATAACCCCCCTTTTTTGACCCTGCT  GTCTCCGTTCTGTTGCACAATTTTCCCCCTTCATCCCCTACAGGTGAAA  TTTTGGTGCTGCTGGTGGGATGTGGCTTGGCACTCGCTTGGGCAGCAAA  ATCCACACCCCAACATCAAACATGCAGCCATCGCTCCAGGCAACGA  TCGAGCCTCATGTGCATGTTTGGGATTTGCTTTTTTCTAAGGATCGATGCT  ACAAGGTACCTGTAGGAAGCCGAAGAGTTGGGCAAGAAGTCCTTCAAG  TACGCTTGGGTTCTTGACAAGCTCAAGGCCGAGCGTGAGCGTGGTATCA  CCATCGATATCGCCCTCTGGAAGTTCGAGACCCCAAGTACAATGTCAC  CGTCATTGGTATGTTTCTTTGCCTTGTTCCCTCATGTGGTTGTACCATATC  TAACGAGAGTAGACGCCCCGGTCACCGTGACTTCATCAAGAACATGAT  CACTGGTACCTCCCAGGCTGACTGCGCTATTCTCATCATTGCTGCCGGT  ACTGGTGAGTTCGAGGCTGGTATCTCCAAGGATGGGTCATASCTGTTTC  CTGAA</p>	<p>T. Soud</p>

Table 16: Results of BT2 sequencing in *T. sudanense* and *T. violaceum*

Number	Sequence	ID
180410-0026	GGGGGGGCTACGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTACGAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACT GGGCAAGGGTCACTA	T.soud
180410-0027	CGGGGGGCTTCCGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTACGAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACT GGGCAAGGGTCACTA	T.soud
180227-0075	GGGGGGGGATCCGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTACGAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACT GGGCAAGGGTCACTAACCT	T.soud
180410-0028	GGGGGGCTTCCGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTACGAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACTGG GCCAAGGGTCACTCCCTTGAAGGGTA	T.soud
180410-0033	GGGGGGGCTTACGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTACGAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACT GGGCAAGGGTCACAA	T.soud
180410-0037	GGGGGGGCTTACGCGTTGCAGCATAATTGTATATTTTCGTGTCTGAATTATTACTGACTTGTTT	T.soud

	TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCT GGGCAAGGGTCACAA	
180410-0017	GGGGTGCTCCGCGTTGCAGCATAATTGTATATTTCTGTGTCGAATTATTACTGACTTGTTTTAC AGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTGG AAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACCG GATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGTT CCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCTGG GCCAAGGGTCACTAACTTTGAGGGTA	T.viol
180227-0070	GGGGGGGCTCCGCGTTGCAGCATAATTGTATATTTCTGTGTCGAATTATTACTGACTTGTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCT GGGCAAGGGTCACTAACTTTGAGGGTA	T.soud
180410-0019	GGTGGTGACTTACGCGTTGCAGCATAATTGTATATTTCTGTGTCGAATTATTACTGACTTGTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGC TGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCT GGGCAAGGGTCACTCACCTTGAGGGTA	T.soud
180410-0022	GTGGTGCTTCCGCGTTGCAGCATAATTGTATATTTCTGTGTCGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCTGG GCCAAGGGTCACAA	T.soud
180227-0053	GGGGGGGCTAGCGTTGCAGCATAATTGTATATTTCTGTGTCGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAACAACCTGG	T.soud

	GCCAAGGGTCACTAACCTTTGAGGGTA	
180306-0068	GGGGGGGCTAGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTAA	T.soud
180621-0047	GATGGGGCTAGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTATTACTGACTTGTTTTAC AGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTGG AAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACCG GATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAAG ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT CCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTCACCTGAAGGTAC	T.viol
180611-0049	GGGGGGCTTCGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTATTACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACCT GGGCAAAGGGTCACAA	T.viol
190118-0005	GGGGGGGCTAGCGTTGCAGCATAATTGTATATTTTCGTGTCGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTCAGCTCTTCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTAACTTGAGGGGTA	T.soud
180625-0012	GGGGGGGGATACGGCGTTGCAGCATAATTGTATATTTTCGTGTCGAATTATTACTGACTTGTT TTACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCG CTGGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTAC ACCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGAC CAAGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATA CGTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTC CTTTCGGTCAGCTCTTCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGGAAACAAC TGGGCAAAGGGTCACAACCTGAAGGGT	T.viol
180410-0021	GGGGGGGCTAGCGTTGCAGCATAATTGTATATTTTCGTGTCGAATTATTACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACTGGGATTTTTATAGCTACACC	T.viol

	GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCCTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCTTT CGGTCAGCTCTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCTGG GCCAAGGGTCACTCACCTTGAGGGTAG	
180227-0045	GGGGGGGCTCCGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTTTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCT GGCCAAGGGTCACTAACCTTGAGGGTAAGT	T.viol
180227-0044	GGGGGGGCTACGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTTTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCT GGCCAAGGGTCACTAACCTTGAGGGTA	T.viol
180420-0056	GGGGGGGCTCCGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTTTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCT GGCCAAGGGTCACTAACCTTGAGGGTA	T.viol
180611-0016	GGGGGGGGCTTCGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTACTGACTTGTTTT TACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTTTCGCT TGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACA CCGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACC AAGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCT GGCCAAGGGTCACTA	T.viol
190118-0006	GGGGCGGCTGCGCGTTGCAGCATAATTGTATATTTTCGTGTCGAATTACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTTTCGCT GGAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACAACCT GGCCAAGGGTCACTCACCTGAGGGTA	T.soud

190118-0012	GGTGGGGCTAGCGTTGCAGCATAATTGTATATTTTCGTGCCGAATTATACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTGAGCTCTCCGCCCCGATAACGTGCTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTA	T.soud
IHEM 13492	GGTGGGGACTAGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAATTATACTGACTTGTTTT ACAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACAC CGGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA AGACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATAC GTTCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCC TTTCGGTCAGCTCTTCCGCCCCGATAACGTGCTCTTCGGTCAGTCCGGTGCCGGAAACAACCT GGCCAAGGGTCACTAACCTGAGGGT	T.soud
180611-0069	GGTGGGACTCCGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAATTATACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTGAGCTCTCCGCCCCGATAACGTGCTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTA	T. Soud
180611-0017	GGTGGTGCTAGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAATTATACTGACTTGTTTTAC AGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTGG AAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACACCG GATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGTT CCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTGAGCTCTCCGCCCCGATAACGTGCTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTAACCTGGAGGGTA	T. Soud
181212-0075	GCGTGTGACTAGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAATTATACTGACTTGTTTTA CAGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTG GAAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACACC GGATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA GACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGT TCCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT CGGTGAGCTCTCCGCCCCGATAACGTGCTCTTCGGTCAGTCCGGTGCCGGAAACAACCTGG GCCAAGGGTCACTAACCTGAGGGT	T. Soud
181212-0074	GAGGGGTATAGCGTTGCAGCATAATTGTATATTTTCGTGTGCGAATTATACTGACTTGTTTTAC AGGCAAACCATTGCTGGTGAGCACGGTCTCGATGGATCCGGCCAGTGAGTGATTCGCTGG AAAATATTTCCAAGTCTCGAGGGACATGAATGTTGACAACCTGGGATTTTTATAGCTACACCG GATCTTCTGACCTCCAATTGGAGCGCATGAATGTCTACTTCAACGAGGTGTGCACGACCAA ACCCTTCCCTTCAGCAGCATACTAACTCATTGGAGGCAAAGGCCTCAAGCAAAAAATACGTT CCCCGTGCGGTGCTTGTGATCTTGAGCCCGCCGCTCTCGATGCTGTCCGTGCCGGTCCCTT	T. Soud

	CGGTCAGCTCTCCGCCCCGATAACGTCGTCTTCGGTCAGTCCGGTGCCGAAACA ACTGGCCAAGGGTCACTCACCTTGAGGGTA	
--	--	--