

Are there cryptic species in Dubia cockroaches and house crickets? What is the evolutionary relationship between Dubia cockroaches and house crickets?

Abstract

This study focuses on the *Blaptica dubia* cockroach and *Acheta domesticus* house cricket to conduct analyses on cryptic species and evolutionary relationships.

Through sequencing COI gene fragments from artificially bred populations, genetic differences are compared to detect cryptic species and construct a phylogenetic tree, clarifying evolutionary branches and degrees of kinship, and precisely resolving taxonomic status, contributing to the evolutionary research of cockroach and cricket groups.

Introduction

The cockroach species *Blaptica dubia* Serville (Blattodea: Blaberidae), originally from South America and named as “Dubia cockroach”, has been one of the soil organisms found in tropical region with high abundance in rain forests. House crickets, mostly distributed in Europe, have been introduced to various parts of the world as animal feed. They were introduced into China many years ago for breeding as feeder crickets.

At the experimental operation level, this study employed two classic methods, the chelex method and the silica method, for the gene extraction of *Blaptica dubia* and white crickets, and conducted a comparative analysis of their effects. The chelex method, characterized by its simplicity of operation and no need for complex purification steps, can quickly obtain genomic DNA from samples.

Materials& Methods

Samples of Dubia cockroaches (*Blaptica dubia*) and house crickets (*Acheta domesticus*) were sourced from a farm-based supplier on Taobao, Suzhou, China. All samples were fresh to preserve biological integrity for subsequent analyses. Once purified DNA was obtained, a PCR mix containing two primers (LCO1490, HC02198), polymerase, buffer, and the extracted DNA was prepared for PCR. Post-PCR, gel electrophoresis was used to verify amplicon sizes. Validated DNA samples then underwent sequencing. Sequence data were analyzed on DNA SUBWAY: raw reads were processed via trimming, pairing, and consensus editing, followed by BLAST to assign scientific names. Finally, maximum likelihood (ML) and neighbor-joining (NJ) phylogenetic trees were constructed to infer sample relationships.

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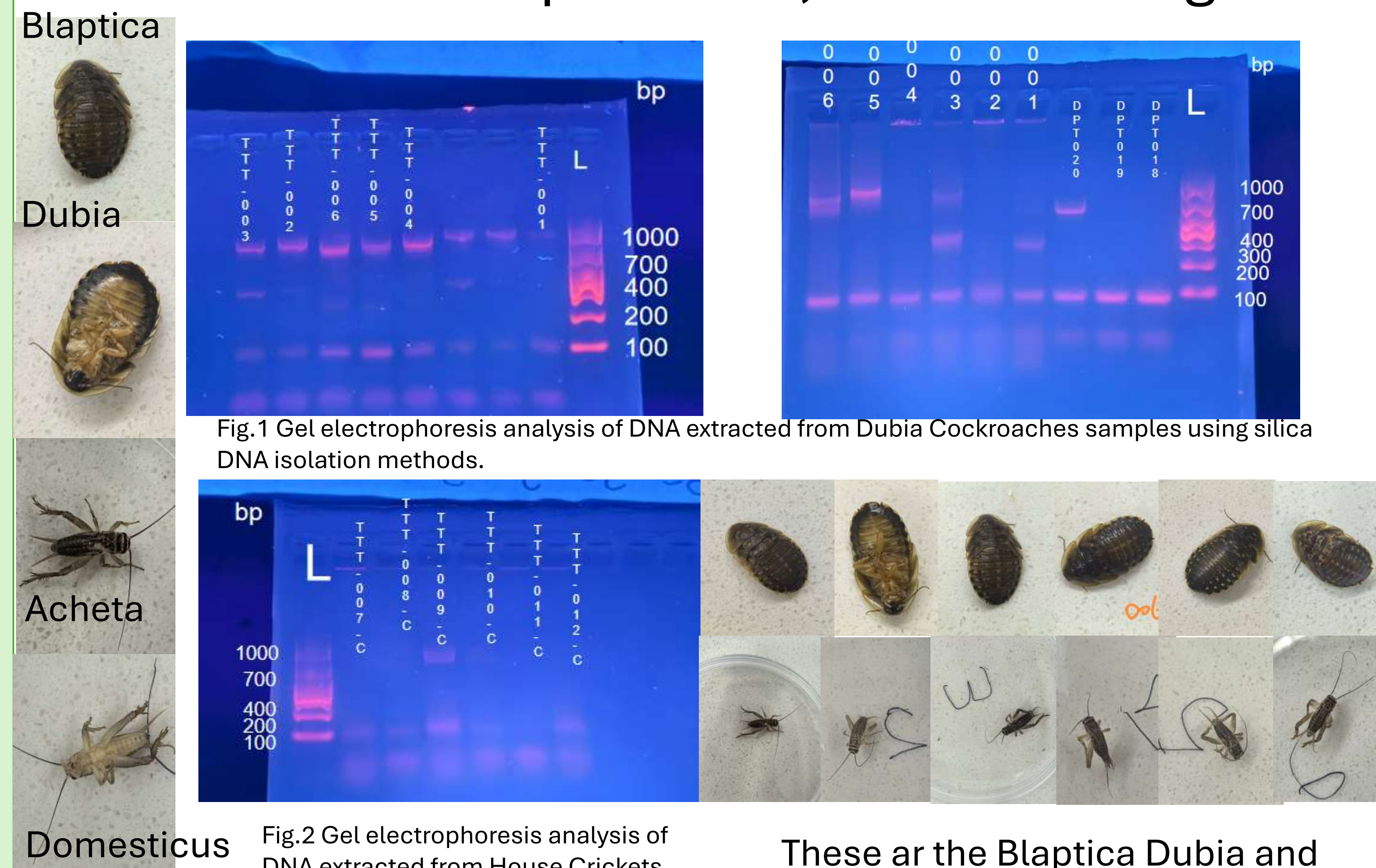
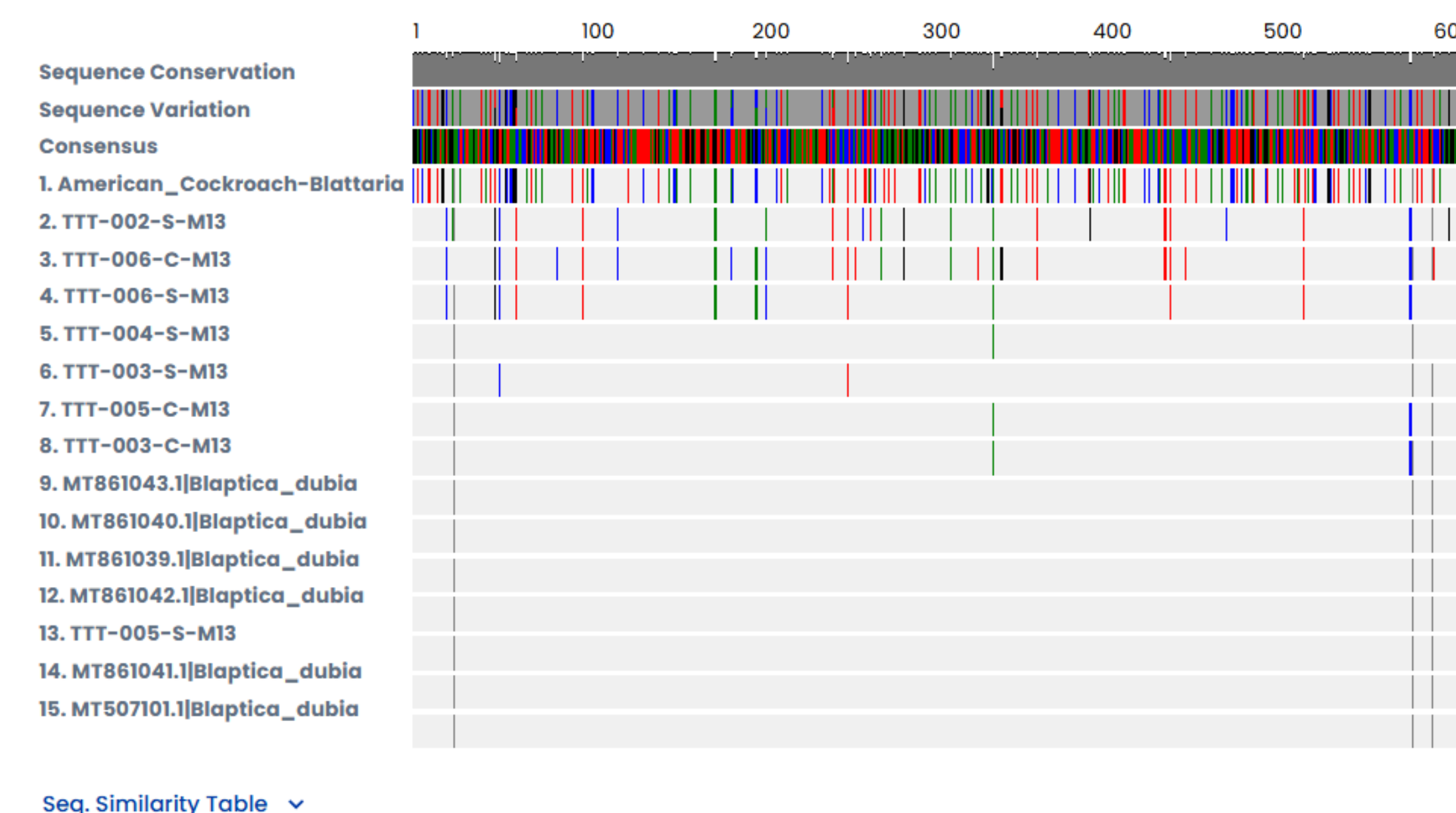


Fig.2 Gel electrophoresis analysis of DNA extracted from House Crickets samples using chelex DNA isolation methods.

These are the *Blaptica Dubia* and *Acheta Domesticus* Samples



The image shows that some of the DNA sequences in the Dubia cockroach samples differ significantly. For example, TTT-006-S and TTT-004-S differ significantly, and show numerous mismatches with BLAST hits. However, some sequences show similar BLAST hits and exhibit relatively few mismatches. This may be due to varying sequence quality, but it is also somewhat surprising.

Discussion

We expected to see many mismatches between sequences, and indeed, we saw some mismatches across the samples, which was consistent with our expectations. This suggests that DNA variation is common among Dubia cockroaches, and this finding may indicate that there are many subspecies and cryptic species within the Dubia cockroach population. These mismatches may indicate subspecies in Dubia cockroaches. The research among subspecies may lead to rich nutrients for reptiles or another pets.

Although we successfully amplified the barcoding region among *Blaptica Dubia*. The same barcoding process for *Acheta Domesticus* seems difficult. So we did not analyze the different barcodes from *Acheta Domesticus*. The reasons may be because of DNA extraction (chelex method), PCR (COI primers binding with the species). In future, I plan to focus on the research about *Blaptica Dubia*, by increasing the number of the organisms. And for *Acheta Domesticus*, we need to figure out a better DNA extraction method and test for different barcode primers.

Reference

https://dnabarcoding101.org/?gad_source=1&gad_campaignid=17625815&gbraid=0AAAAAD9ACLIeamlfByucNRrh1dwLKOu&gclid=CjwKCAjwwNbEBhBpEiwAFYlTGG9CKRKATSUsgcWO4e8c3ZxL9HXmnyzJhkTwU55AfsdGTucS65jB7hoCN88QAvD_BwE

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