



鑑定海味及滋補食品平台之初階段開發

First Stage Development of Platform for Authentication of Dried Seafood and Tonic Food Products



關海山教授

Prof. Hoi-Shan KWAN

香港中文大學 食品研究中心

Food Research Centre

The Chinese University of Hong Kong

香港食品安全檢測和認證的發展與機會

Development and Opportunity of Food Safety Testing and Certification in Hong Kong



- 香港的**檢測及認證業**獲定為六大優勢產業之一

Development of six industries where Hong Kong enjoys clear advantages

- 香港政府於**2009**年成立香港檢測和認證局

Hong Kong Council for Testing and Certification established in 2009

- 食品檢測**被選定大有市場發展潛力的**4**大領域之一

Food testing is one of the four areas with great market potential

一所大學如何協助香港的檢測和認證業呢？

How does a university assist in the testing and certification industry?



大學的角色 The Role of a University

- 向**政府**提供科學意見
To provide scientific opinion to the Government
 - 專家委員會 **Expert Committee**
- 向**業界**提供諮詢意見和服務研究項目
To provide advise and research service to the industry
 - 顧問服務 **Consultancy services**
 - 常規實驗室工作 **General laboratory works**
 - 技術研討會 **Technical seminars**
- 向**市民**灌輸食品安全的知識
To educate the public about food safety knowledge
 - 探訪學校和社區講座 **School visits and community talks**
- 作為政府和行業之間的**橋樑**
Connecting the Government and the industry

食品研究 FOOD RESEARCH



作出「虛假說明」 Fraudulent substitution?

鮑片 Abalone slide?
螺片 Whelk piece?



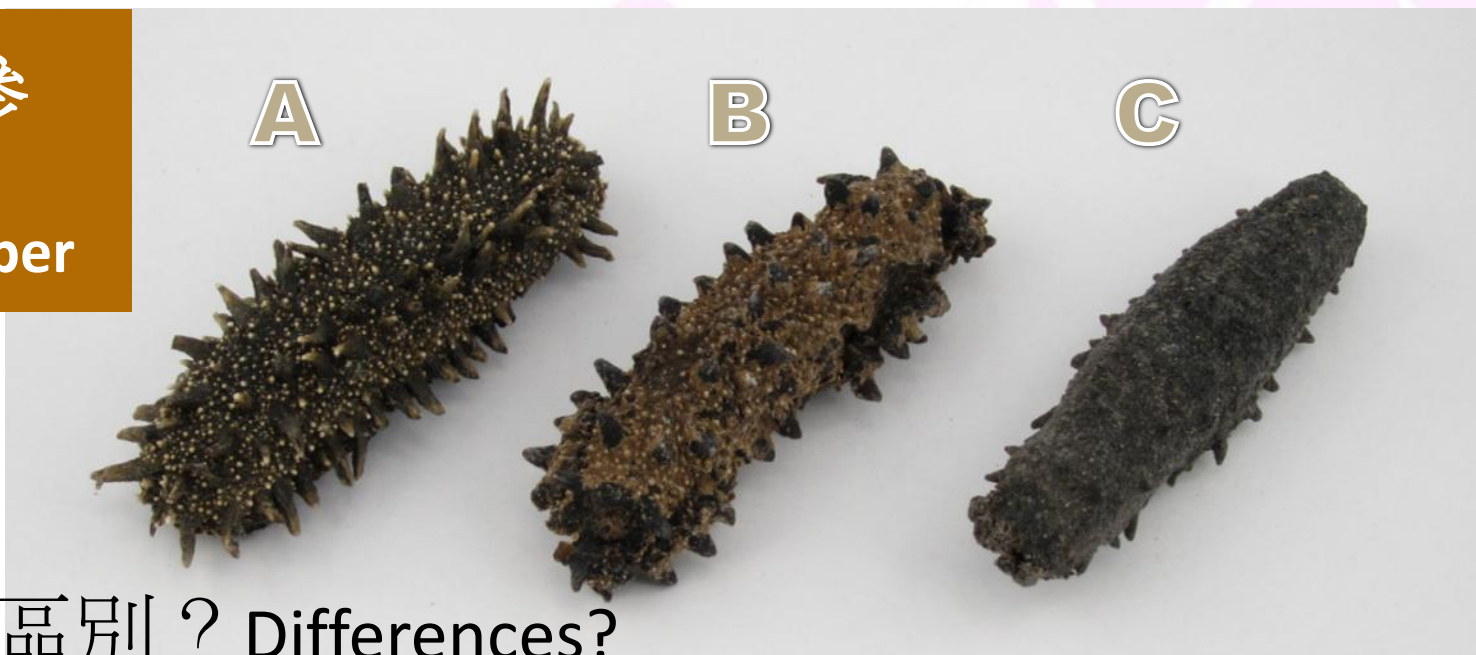
較容易分辨出來
Easy to distinguish



不容易分辨出來
Not easy to distinguish

作出「虛假說明」 Fraudulent substitution?

海參
Sea
cucumber



有什麼區別？ Differences?

哪一個樣本是最昂貴的？ Which is the most expensive?

有相同的名稱，並聲稱是相同類別和級別
Same claimed name, category and grading

聲稱是來自相同產地
Same geographic origin claimed



作出「虛假說明」 Fraudulent substitution?

鮑魚



吉品鮑 (*Yoshihama Abalone*) ?

每斤 HKD 12000



禾麻鮑 (*Oma Abalone*) ?

每斤 HKD 9000

有什麼區別？ Differences?

哪一個樣本是最昂貴的？ Which is the most expensive?



		切片形	特徵
圓鱈			圓鱈的體型呈圓形，切下後的魚片也近似橢圓形狀。
扁鱈			體形較長，稍側扁，上頷略長於下頷，頸部有一觸鬚，鬚長等於或略長於眼徑。
油魚			魚身光滑顏色暗褐，鱗片細小呈針狀。魚肉則呈黃白色，口感吃起來像雞肉。



技術應用 Technology application:

新世代定序技術

Next Generation DNA Sequencing



Roche 454 GS FLX Titanium sequencing System

油魚 Oilfish vs. 鱈魚 Codfish

鑑定海味及滋補食品平台之初階段開發

First Stage Development of Platform for Authentication of Dried Seafood and Tonic Food Products

目標 Objectives

- 以新一代測序技術 (next-generation sequencing technology) ，為本港常見海味及滋補食品，構建複合**DNA標記數據集** (multiple DNA markers dataset)
- 建立可用來鑑別本港常見海味及滋補食品的**DNA 數據庫** (DNA Database)

由創新及科技基金資助

Funded by The Innovation and Technology Fund

鑑定海味及滋補食品平台之初階段開發

First Stage Development of Platform for Authentication of Dried Seafood and Tonic Food Products

合作伙伴 Cooperating parties

- 本地大學
Local University
- 本港海味乾貨零售和批發商
Local dried seafood retailers and wholesalers
- 本港檢測及認證機構
Local testing and certification organizations

由創新及科技基金資助

Funded by The Innovation and Technology Fund

主要針對五大類海味和滋補食品

Targeted on 5 main dried seafood and tonic products



鮑魚

Abalone

花膠

Fish maw

干貝

Dried Scallops

海參

Sea cucumber

燕窩

Bird's nest

接近300個樣本
Close to 300 samples



鑑定海味及滋補食品平台之初階段開發

由創新及科技基金資助

採購樣本

- 以顧客身份

記錄

- 來源、外觀、特徵等

提取DNA

- 測試不同的提取方法

擴增DNA標記

- 以聚合酶鏈反應（PCR）

大型DNA定序

- 新世代定序技術

DNA標記數據集

採集野生樣本

干貝和燕窩的憑證標本

專家檢定

提取DNA

大型DNA定序

獨有的DNA序列
參考數據庫

研發快速測試



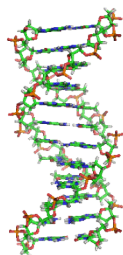
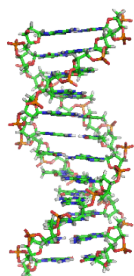
複合DNA標記 數據集



Abalone A
鮑魚

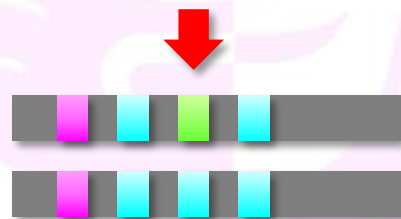


Abalone B
鮑魚



測序 Sequencing

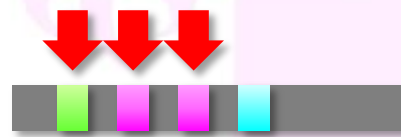
DNA標記 (DNA markers)



鮑魚 Abalone A

鮑魚 Abalone B

對比 vs.



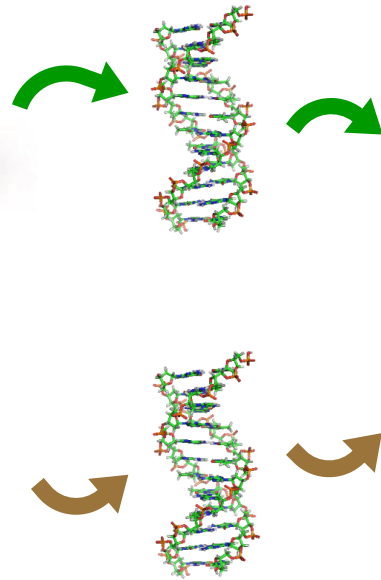
螺 Whelk



憑證標本 Voucher species

干貝和燕窩 Dried scallop and Bird nest

干貝



測序
Sequencing



DNA標記
DNA markers



參考 DNA數據庫
Reference DNA database



一個獨有的DNA序列參考數據庫
A unique DNA sequence reference database

計劃進度 Progress

- 以顧客身份 Sampling as customer
 - 從不同地區包括中上環、油尖旺、新界等Several locations (including Central, Sheung Wan, Yau Ma Tei, Mongkok, N.T., etc.)
 - 從零售及批發商包括老行尊、大型連鎖、個別店舖Retailers, wholesalers (including old shops, chain stores, individual shops)
- 已購買超過270個樣本
Over 270 samples were bought

2011年3月
日本東北9級地震



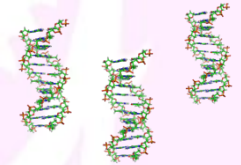
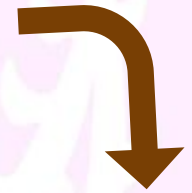
計劃進度 Progress

已成功從95%以上樣本
提取可用DNA作定序

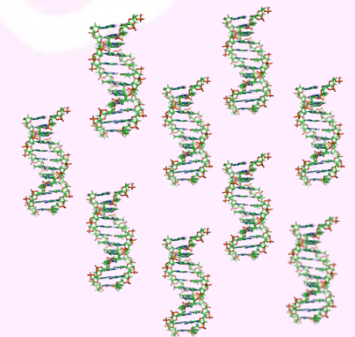
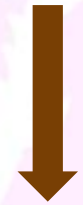
95% Successful DNA extraction
from samples for sequencing



提取



擴增



乾海參樣本須要特別處理
Special treatment needed for
dried sea cucumbers

原材料須經清洗及浸泡

Washing and soaking needed for raw materials

→ DNA提取物須稀釋干擾物質

Dilution needed for DNA extracts



計劃進度 Progress



部份鮑魚及燕窩樣本 → 初步基因定序
Preliminary sequencing of some Abalone and Bird
nest samples



鮑魚 ABALONE

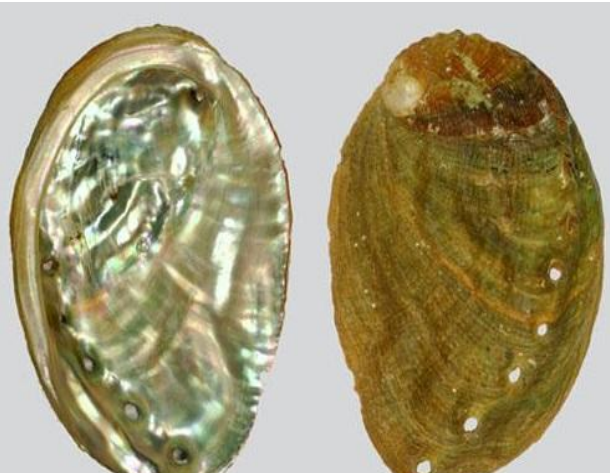
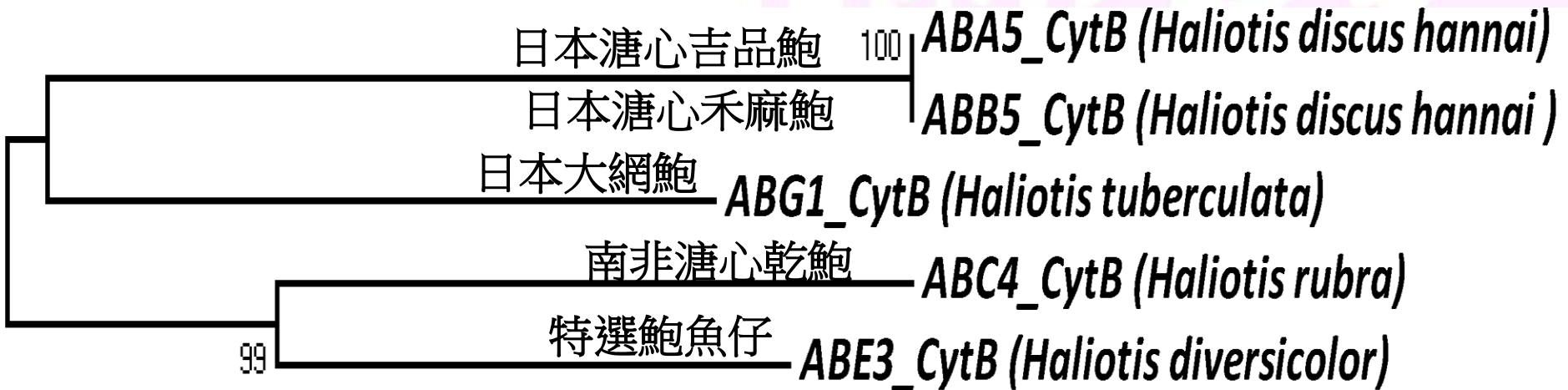
基因序列比對分析結果 BLAST result of DNA sequences

樣本 Sample	最相似物種 (最高相似值) BLAST result (highest match)					聲稱類別 Claimed category	結論 Conclusion
	16S	CO1	12S	CytB	CytB2		
ABA5	99%	99%	97%	98%	96%	日本溏心吉 品鮑	<i>Haliotis discus hannai</i>
	<i>Haliotis discus hannai</i>						
ABB5	99%	98%	99%	97%	94%	日本溏心禾 麻鮑	<i>Haliotis discus hannai</i>
	<i>Haliotis discus hannai</i>				<i>Euhadra sp.</i>		
ABC4	94%	99%	99%	100%	99%	日本大網鮑	<i>Haliotis rubra</i>
	<i>Haliotis madaka</i>	<i>Haliotis rubra</i>					
ABE3	NA	99%	85%	84%	94%	南非溏心乾 鮑	<i>Haliotis midae</i>
	NA	<i>Haliotis midae</i>	<i>Haliotis rubra</i>	<i>Haliotis diversicolor</i>	<i>Euhadra sp.</i>		
ABG1	99%	97%	99%	99%	99%	特選鮑魚仔	<i>Haliotis tuberculata</i>
	<i>Haliotis madaka</i>	<i>Haliotis discus hannai</i>	<i>Haliotis tuberculata</i>				

鮑魚 ABALONE

演化樹 PHYLOGENETIC TREE

Genus: *Haliotis* (鮑螺屬)



Haliotis discus hannai



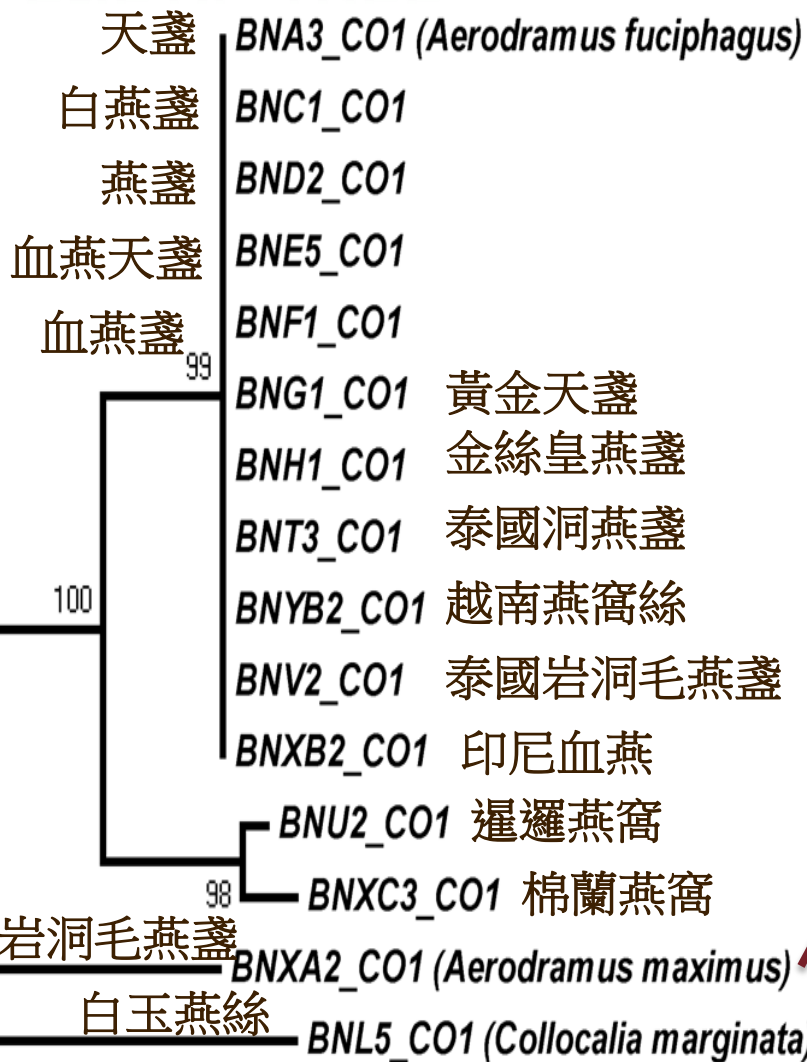
Haliotis rubra



Haliotis tuberculata

燕窩 EDIBLE BIRD'S NEST

演化樹 PHYLOGENETIC TREE



Genus:
Aerodramus
(金絲燕屬)

Collocalia (金絲燕屬)

0.01



Roche 454 GS FLX
Titanium System



DNA標記
DNA markers



大型DNA定序即將展開

Large scale DNA sequencing is about to start



Welcome to dried seafood and tonic food products DNA database

Abstract

Because of its duty-free status, Hong Kong has been recognized as the largest regional entrepôt for dried seafood and tonic food products. Since species of the products are identified by traders' own experiences, it is not easy for the consumers (sometimes even for the trade) to distinguish the premium products from those with lesser value. However, the trade and the relevant authorities have difficulties in verifying the identity of these products for authentication, quality control and assurance. This project will develop a platform for DNA-based species authentication of common dried seafood and tonic food products in Hong Kong. The platform will enable the trade to regularly monitor and verify the identity of their products and will also provide the authorities

Objectives

- (1) To identify local dried seafood and tonic food products that can be identified by DNA methods
- (2) To construct a multiple DNA markers dataset for those selected products using pyrosequencing technology
- (3) By using dried scallop and bird's nest products as prototype, to generate our own reference DNA sequence dataset based on voucher specimens and multiple DNA markers
- (4) To authenticate all selected products at species level by matching their DNA sequences with those archived in authoritative databases (e.g. BOLD) and our own reference DNA sequence dataset
- (5) To develop a category-based rapid kit that enables fast distinguishing the "genuine" products from the fakes for front-line quality control purposes

建造中
Under construction

The Project

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Genetic Catalogue

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Abalone

Abalone (from Spanish abulón) are small to very large-sized edible sea snails, marine gastropod mollusks in the family Haliotidae and the genus Haliotis. Common names for abalones also include ear-shells, sea ears, as well as muttonfish or muttonshells in Australia, ormer in Great Britain, perlemoen and venus's-ears in South Africa and pūua in New Zealand

The shells of abalones have a low and open spiral structure, and are characterized by several open respiratory pores in a row near the shell's outer edge. The thick inner layer of the shell is composed of nacre or mother-of-pearl, which in many species is highly iridescent, giving rise to a range of strong and changeable colors, which make the shells attractive to humans as decorative objects, and as a source of colorful mother-of-pearl.

[Read More](#)

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Abalone



AB-G-1 [Read More](#)

Sample Description: 鮑魚仔
Shop Category: 街舖
Sampling Date: 2011-04-06



AB-E-3 [Read More](#)

Sample Description: 南非塘心乾鮑 (24-26頭)
Shop Category: 街舖/老字號
Sampling Date: 2011-04-07



AB-C-4 [Read More](#)

Sample Description: 日本網鮑 (8頭)
Shop Category: 街舖
Sampling Date: 2011-04-07



AB-B-5 [Read More](#)

Sample Description: 日本禾麻魚 (36頭, 岩手縣舊貨)
Shop Category: 街舖
Sampling Date: 2011-03-25

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海味DNA數據庫

樣本DNA序列庫 Sample DNA sequence database

AB-A-5



Sample Description: 日本吉品鮑 (34頭)
Shop Category: 街舖
Sampling Date: 2011-03-25



Acc No.	Species	Gene Symbol	Description	Images	Wikipedia
ABA5_12S	Abalone	12S	ABA5_12S	img	Wiki
ABA5_16S	Abalone	16S	ABA5_16S	img	Wiki
ABA5_CO1	Abalone	CO1	ABA5_CO1	img	Wiki
ABA5_CytB	Abalone	CytB	ABA5_CytB	img	Wiki
ABA5_CytB2	Abalone	CytB2	ABA5_CytB2	img	Wiki

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海味DNA數據庫

DNA序列搜尋 DNA sequence search

[Print](#)
[PDF](#)
[Excel](#)
[CSV](#)
[Copy](#)

Search

Show entries

Search:

Acc No.	Species	Gene Symbol	Description	Images	Wikipedia
NC_003177	Stephanolepis cirrifer	16S,COI,Cyt B	Stephanolepis cirrifer mitochondri...	img	Wiki
NC_004299	Takifugu rubripes	16S,COI,Cyt B	Takifugu rubripes mitochondrion, co...	img	Wiki
NC_004416	Sufflamen fraenatum	16S,COI,Cyt B	Sufflamen fraenatum mitochondrion, ...	img	Wiki
NC_007176	Tetraodon nigroviridis	16S,COI,Cyt B	Tetraodon nigroviridis mitochondrio...	img	Wiki
NC_007887	Ranzania laevis	16S,COI,Cyt B	Ranzania laevis mitochondrion, comp...	img	Wiki
NC_009859	Triodon macropterus	16S,COI,Cyt B	Triodon macropterus mitochondrion, ...	img	Wiki
NC_009860	Macrorhamphosodes uradoi	16S,COI,Cyt B	Macrorhamphosodes uradoi mitochondr...	img	Wiki
NC_009861	Triacanthodes anomalus	16S,COI,Cyt B	Triacanthodes anomalus mitochondrio...	img	Wiki
NC_009862	Trixipichthys weberi	16S,COI,Cyt B	Trixipichthys weberi mitochondrion...	img	Wiki
NC_009863	Triacanthus biaculeatus	16S,COI,Cyt B	Triacanthus biaculeatus mitochondri...	img	Wiki

Showing 1 to 10 of 101 entries

[First](#)
[Previous](#)
[1](#)
[2](#)
[3](#)
[4](#)
[5](#)
[Next](#)
[Last](#)

* Common Name: (example)

Organism:

Gene Symbol:

☒ 16S
 ☒ COI
 ☐ Cyt B

Database:

Genome:

海味DNA數據庫

DNA序列比對 DNA sequence comparison

Dried Seafood and Tonic Food Products DNA Database

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Blast

Choose program to use and database to search: [\(example\)](#)

Program: Database:

Enter sequence below in **FASTA** format: [?](#)

```
>XXXXX
ATGGCAAGCCTCCGAAAACTCACCCGCTACTAAAAATCGCTAACGACGCACTAGTTGACCTCCCCA
CCCCCTCTAATATCTCTGCATGATGAAACTTTGGCTCACTACTTGGCCTTTGCCTTATTTCTCAAAT
CCTTACAGGACTATTCTCGCAATGCACTACACCCTCAGTAGCCACATTGCCGAGATGTCAACTT
CGGTTGACTCATCCGGAACCTCCACGCAAACGGGGCCTCTTTCTTTTATTACTACGGCTCTTAC
CTATACAAAGAAACATGAAACATCGGAGTAGTACTACTACTTCTAGTTATGATGACCGCCTTCGTTG
GCAGATGTCCTTTCTGAGGAGCTACCGTCATTACTAACCTTCTATCCGCAGTCCCATATGTCGGAAC
ACTCTCGTTGAATGAATCCTCACCCGATTCTTCGCATTCCACTTCCTATTCCCATTTCGTCATCGCAG
```

Or load it from disk: No file chosen

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香港實驗所認可計劃 HOKLAS

HOKLAS Supplementary Criteria No. 43

“Food” test category – Species Identification by DNA Sequencing for Authentication Purpose

Chapter 8 – Measurement Traceability

❑ If certified reference materials not available,

→ Homology matching from reference DNA sequences in public sequence database (e.g. GenBank or RefSeq)

→ Verify by either

- a) Independently submitted sequence by two different groups of researchers and the homology is 100%
- b) Submitted by a recognized laboratory, which has published significant work on the target species/varieties

Thank You

Prof. Kwan Hoi Shan

E-mail: hskwan@eservices.cuhk.edu.hk

Tel: 2609 6285 Fax: 2696 1146

Food Research Centre

Tel: (852) 2609 6273

Fax: (852) 2696 1146

Dr. Cheung, William E-mail: william.m.w.cheung@gmail.com

Dr. Mak, Cheryl E-mail: makszepui@cuhk.edu.hk

Address

Rm EG06, Science Centre East Block, Food Research Centre, The
Chinese University of Hong Kong, Shatin, N.T., Hong Kong

5類常見海味及滋補食品的
複合**DNA**標記數據集

Multiple **DNA markers**
database of 5 common dried
seafood and tonic products

可用來鑑別本港5類常見海
味及滋補食品的**DNA**數據
庫

A **DNA database for**
authentication of 5 common
dried seafood and tonic
products

可用來鑑別本港5類常見海味及滋補食品的**快速測試**
Fast kit for authentication of 5 common dried seafood and
tonic products