CCSBT-CC/0704/11

DNA Sampling
DNAサンプリング

USE OF GENETICS IN VERIFICATION OF SPECIES IDENTIFICATION AND LEGAL ORIGIN DURING TRADE OF SOUTHERN BLUEFIN TUNA
みなみまぐろの種同定及び取引における法的起源の確認における遺伝学の利用

Dr James Findlay
ジェームス・フィンドレー博士
Bureau of Rural Sciences
地方科学局

Abstract
要約
Genetics offers a powerful tool to complement other Monitoring, Control and Surveillance (MCS) techniques as it allows reliable species identification at any stage of the supply chain. It may also be used to discriminate legal and illegal SBT.
遺伝学はそのほかのモニタリング・コントロール及び監視 (MCS)の技術を補完する強力なツールである。さらに、合法的・非合法的SBT を区別することにも使用できる。

Introduction
序説

1. There are two key questions that must be answered in order to effectively monitor the trade of Southern Bluefin Tuna (SBT) from the point of capture through to the point of sale to consumers. These are:
   みなみまぐろの取引を漁獲から消費者に販売されるまで効果的に監視するために、解決すべき2つの主要課題がある。それは、
   a) Is it SBT?; and
      SBTであるか?　及び、
   b) Was it legally caught?
      合法的に漁獲されたものか?
2. Modern genetic techniques have the potential to cost-effectively answer both of the questions and when combined with appropriate audit trails and inspections it can provide a powerful tool in a reliable monitoring and compliance scheme.
   現在の遺伝子技術は、両方の課題に高い費用対効果で回答する可能性を有しており、適切な追跡記録と検査を組み合わせれば、信頼できる監視と遵守のスキームの強力なツールと成りえる。

3. Genetic testing is already a requirement in the Australian SBT quota management arrangements (see below) and has been considered by other regional fisheries management organisations as a tool for monitoring catch of tuna species.
遺伝子検査は、すでにオーストラリアSBT割当管理協定における要件となっており(以下参照)、まぐろ類の漁獲監視ツールとして他の地域漁業管理機関によって検討されている。

Is it SBT?

SBT であるのか?

4. Most experienced fishers and trained fisheries officers can discriminate between unprocessed SBT (*Thunnus maccoyii*) and most other species of tuna except Atlantic bluefin, *Thunnus thynnus* and Pacific bluefin *Thunnus orientalis*. Bluefin tuna in excess of 300kg can be identified as being either Atlantic or Pacific bluefin (i.e. not SBT) as such fish would exceed the maximum recorded size of SBT.
ほとんどの経験のある漁業者及び訓練された漁業当局者は、未加工のSBTと大西洋くろまぐろ及び太平洋くろまぐろを除く他のまぐろ類とを区別することができる。SBTの最大記録を超えるような300kg超のくろまぐろは、大西洋又は太平洋くろまぐろ(即ちSBTではない)と判断しうる。
5. Experienced fish biologists can morphologically discriminate between the three species of bluefin tuna at all sizes (with some uncertainty) while fish are unprocessed (i.e. whole with gut and gills *in situ*). However, once the fish is processed, species identification becomes increasingly uncertain as the level of processing progresses. For example, two of the key features used to discriminate SBT from the other Bluefin tuna species are the colour patterns of the liver and the number of gill rakers. Once these are removed (e.g. when a fish is gutted and gilled), species discrimination becomes much more uncertain. Species discrimination without the use of genetics is almost impossible from loins and fillets.
経験のある魚類学者は、魚が未加工(即ち、エラハラのある、あるがままの全魚体)であれば、すべてのサイズで(不確実性はともなう)、くろまぐろの3種間で、形態から区別することができる。しかしながら、一旦魚が加工されると、加工の進み具合に応じ、種同定の不確実性が大いに高まる。例えば、他のくろまぐろ類からSBTを区別するのに用いる2つの主要な特徴は、肝臓のカラー・パターンと鰓師の数である。それらが除されると(即ち、魚がGGの状態)、種の区別はより一層不確実なものになる。遺伝学を利用しない種の区別は、ロイン及びフィレにおいて不可能に近い。
6. Modern genetic techniques, using species-specific markers and probes, are powerful and cost-effective tools in the reliable identification of SBT. At present in Australia,

all bluefin are considered SBT for the purposes of compliance with individually transferable quotas unless genetic tests are undertaken (at the expense of the fisher) to verify that fact that the fish is not an SBT (i.e. quota is decremented for all Bluefin unless the genetic test shows that the specimen is not an SBT).
種特定マーカーとプローブを利用した現在の遺伝子技術は、SBTの信頼できる判断における強力かつ高い費用対効果のあるツールである。オーストラリアでは現在、すべてのくろまぐろは、SBTではないことを確認するための遺伝子検査(漁業者負担)が行われない限り、ITQ遵守の目的において、SBTと見なされる(即ち、遺伝子検査によって標本がSBTでないと示されない限り、すべてのくろまぐろが割当から除される)。

Was it caught legally?

合法的に漁獲されたものか?

7. Beyond discriminating between species, forensic genetic techniques (genetic 'fingerprinting') have the ability to discriminate between individuals of the same species. Hence, it may be feasible to use forensic genetics to discriminate between legal and illegal SBT at any point between capture and retail sale by taking samples from all legally caught SBT and using these as a basis for genetic 'finger-print' comparisons to samples collected from elsewhere in the supply chain.
種間の識別については、法医学における遺伝学的技術(遺伝学的「フィンガープリンティング」)が、同種間の個々を識別する能力を有している。従って、法に則り漁獲されたすべてのSBTからサンプルを抽出し、流通段階において収集されたサンプルと遺伝学的「フィンガープリンティング」を比較する根拠に用いることにより、漁獲と小売り間のどの段階においても、合法的なSBTか否かを識別するために、法医学的な遺伝学を利用することができる。

How much would it cost?

費用は?

8. At this stage, we have not attempted to design a genetic sampling and testing system for the CCSBT. The specific design should be part of an integrated MCS approach. Until there is further development of the MCS system for the CCSBT it would be impossible to cost a genetic component. Specific genetic probes to identify SBT and northern bluefin have been developed and used by CSIRO.
現時点では、CCSBTの遺伝子サンプリング及びテスト・システムの設計を行っていない。具体的な設計は統合的なMCS措置の一部となろう。CCSBTのMCSシステムのさらなる進展がない限り、遺伝学分野の見積もりは困難である。SBTとNBTを認識するための具体的な遺伝的プローブは、CSIROにより開発、使用されている。

Additional Benefits

追加的な利点

9. In addition to providing a powerful component within a broader monitoring and compliance framework, genetic sampling provides considerable potential as a scientific tool for the estimation of fishing mortality rates and population size both alone and in conjunction with conventional tagging studies. Hence, such applications with further improve the cost-effectiveness of genetic approaches to MCS.

   広い範囲の監視及び遵守の枠組みにおいて強力な要素を提供することに加え、遺伝子サンプリングは、委員会のタギング調査と併用することで、漁業死亡率の推定及び体長組成の推定するための科学的ツールとして相当な可能性を与える。従って、さらなる応用はMCSに対する遺伝学的手法の費用対効果を改善することになる。

事務局による翻訳

IWC Resolution 1997-2

Resolution on Improved Monitoring of Whale Product Stockpiles

RECOGNISING the progress in establishing reliable techniques for identifying the origin of whale meat and whale products, including the species and geographic stock of origin and individual identification of legally obtained and marketed whale products, through DNA testing and genetic analysis;

NOTING the recent accomplishments of Japan, Norway and the United States in the establishment of reference sets of 'type species' of cetacean DNA sequences for use in addressing the problems of unreported bycatch and illegal trade by determining the source species and geographic origin of such products and the development of market survey programmes utilising DNA testing by some member governments;

RECOGNISING that some whale products legally sold in the domestic markets of some countries are from sources (such as frozen stockpiles and fisheries bycatch) that are not systematically sampled, making it difficult for fisheries personnel to develop market survey programmes to determine the origin of whale meat sold commercially;

RECOGNISING FURTHER that CITES has called upon member nations to report on the status of stockpiles of whale meat, in order to facilitate the monitoring of illegal trade, and has invited all countries concerned to co-operate in determining the sources of whale meat in cases of smuggling or unknown identity;

NOW THERFORE the International Whaling Commission:

ENCOURAGES all Contacting Governments to provide information to the IWC about the size of remaining stockpiles and the species of origin of meat remaining in stockpiles, and to collect and inventory skin or meat samples for DNA identification from all whales that enter into commerce, and to make the DNA database available to the IWC;

REQUESTS that the IWC Secretariat forward to the CITES Secretariat this Resolution and this year's reports of the Infractions Sub-committee and the Scientific Committee.