การนำพันธุ์ปลาต่างประเทศเข้ามาเลี้ยงในประเทศไทย

The Introduction into Thailand of Foreign Species of Fishes[1]

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Thailand is acclaimed to be one of the richest areas for tropical aquatic life in the world. This is due to the favorable physical and biological conditions and the diversity of habitats that make the fish fauna of Thailand greatly and abundantly developed. For fresh-water fishes alone, Smith (1945) made known that there are 560 species. For the salt-water varieties, Rofen (1963) estimated that there would be over 2,000 kinds in the Gulf of Thailand. A great variety of these fishes are of economic importance and many of them are excellent aquarium fishes which are gaining worldwide popularity.

This fact is made evident by the information received from one of the foremost ornamental fish dealers in Bangkok who pointed out that not less than 50 species of Thai fishes (List A) numbering about 2,115,000 individuals have been annually exported to foreign lands. Outstanding among them are the members of the Cyprinidae which, according to Smith (1945), are the most numerous as regards to genera and species. The cyprinids have been sent to Europe and America yearly and the exportation is becoming a very promising business.

The fresh-water fishes such as the gouramis, *Trichogaster pectoralis*, *T. trichopterus* and their allies in the swamps are as much an integral part of the wildlife of our central plain as are the mud fish, *Ophicephalus striatus*, and other cyprinids. They all delight our fishermen in many areas and are regarded as our natural asset. Some of them are excellent for pond culture and were introduced into the neighbouring countries for cultivation in impounded waters. Schuster (1951) recorded that kissing gourami *Helostoma temmincki* (C.V.) was taken to the Philippines in 1948 and the "pla-salit," *Trichogaster pectoralis* (Regan) was introduced into Malaya in 1921 and into Java in 1934.

In spite of this fact, an investigation recently made on the live fish trade in Bangkok reveals that a considerable number of foreign species of fishes has been imported in return for cultural and ornamental purposes. This human action in the introducing of exotic animals is known to have been practiced in Thailand in the historical time possibly before the eighteenth century, but at that period the number and species of fishes in the trade were very

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limited. One or two species were introduced for ornamental use and only a couple of them were for cultural purposes; the gold fish *Carassius auratus* (Linnaeus), for instance, was found in Thailand as early as 1865, and the presence of the common carp, *Cyprinus carpio* (Linnaeus) which is well known the world over for its value as food fish, was noted to be in Thailand for the first time by Fowler in 1937.

The Government of Thailand, recognizing the increasing demand for fish by a rapidly expanding population and aiming to increase the country's fish production, has been encouraging and assisting private fish pond owners to develop fish culture by every possible means. For this purpose the importation of species of foreign pond fishes has been one of the measures practiced, and the introduction of other selected species may be expected now and then but not as frequent as the introduction of foreign aquarium fishes, various species (List C.) of which have been more intensively and repeatedly imported.

Nowadays foreign fishes introduced into Thailand can be divided into three groups: first, the domesticated species imported for cultivation in the impounded waters; second, the species of fishes for larvicidal purpose; and third, the aquarium fishes of various species of which have been more frequently and intensively imported (List C).

Fishes for Culture Purposes

The outstanding among the imported pond fishes in value and popularity are the Chinese carps (List B). The fingerlings of these fishes were formerly ordered from the Chinese mainland, but at the present they are from the port of Hongkong. This business of transplanting food fishes into Thailand depends on the ease with which certain kinds may be transported. Most of these carps are sucessfully reared in captivity until they reach marketable size. There is at least one of them, the *Cyprinus carpio*, which breeds readily in captivity and has been one of the principal fishes distributed. This fish appears very promising for intensive culture in ponds and reservoirs. At present the stock of this common carp can be regarded as a valuable addition to the native cyprinids.

These exotic carps are considered excellent eating and are highly esteemed by the Chinese population. The fish demands a very high price especially on Chinese New Year's day and other important religious occasions. These Chinese carps are considered excellent food fish because, in popular opinion, its flesh is richer, better flavoured and more nourishing than many other fish. On certain days the value of one kilogram weight of Chinese carp would cost 25 to 35 baht (U.S. dollars=1.25 - 1.75) when the average price of local food fish of equivalent weight requires only 5 baht. Being epicureans, the Chinese prefer live fish to processed ones for culinary use. Hence dead carps get only about one third the price of the live fish.

In addition to the common variety of the *Cyprinus carpio* cultivated in ponds, on November 21, 1962, the Faculty of Fisheries, Kasetsart University, received, through the good office of the Japanese Embassy in Bangkok, two pairs of adult and 230 fingerlings of another variety of carp from the Saitama Prefecture Fisheries Experiment Station. These Japanese carps, expected to be good for rice field fish culture, were released into the nursery ponds waiting for further eperimental study.

These common carps of Asian varieties feed on crustaceans, insects and molluscs. They suck the earth and make the water look muddy. The fish is reported not suitable for release in waters where it is difficult for harvesting.

It has been observed that the other species of carps cultivated, the *Aristichthys nobilis* and *Hypophthalmichthys molitrix*, feed on phytoplankton and detritus. Neither of them spawn in ponds. The *Ctenopharyngodon idellus* also prefers to feed on aquatic vegetables and leaves of land plants. It does not spawn in captivity and is regarded as not suitable for cultivation outside ponds or enclosed water.

Aside from the foreign cyprinids ordered from abroad, the Department of Fisheries has been introducing recently a few species of cichlids or mouth breeders (List B). The first one is the mouth breeder, *Tilapia mossambica* Peters. About 258 fish of this species were brought from Penang, Malaysia, in 1851 for pond culture purpose. They are now very well established and have reproduced abundantly and become progenitors of both fresh-water and brackish-water stocks which have been yielding hundreds of tons of fish a year. This tilapia, recognized to be very productive in swamps and marshes, is probably suitable for waters that are under populated. It feeds on phytoplankton, crustaceans and detritus and adopts itself easily to brackish water conditions.

This tilapia grows to marketable size of 150 gram weight in less than six months. The fish reaches maturity when it is 4 months old and can reproduce 3-4 times a year. The maximum size of this fish is 850 grams and it has become one of the principal fish distributed. Thousands of fingerlings and brood-sized tilapias have been released into the irrigation reservoirs and lakes. The stocking so far appears to give excellent results except where the snakehead fish, *Ophicephalus* is present. In the northeast provinces of Thailand such as Udorn-thani and Sakon-nakhorn, *T. mossambica* is the principal species raised in the hatcheries and stocked into farm ponds.

Now many pond owners have cultured tilapia on their property. This fish could become established in any fresh-water or brackish-water because temperature and salinity ranges there are within their physiological tolerance. In his notes on the tilapia recently introduced into California, Amant (1966) found that tilapia can survive temperature of 42°F., and they spawn in sea water having a salinity of about 34.85%. According to him, when undesirable consequences of tilapia becoming estab-

lished in the Salton Sea, prompted an attempt to eradicate them from the pond and tributary with rotenone, thousands could neither be collected nor removed from wherever they were. The only means of controlling a problem like this is by fisheries-service which needs to be well planned and ahead of the development.

The tilapias were carried to the North and the Northeast in immense numbers. There they did so well that they have now been put up for sale in the local markets. These fish, prized by the Northerners, were afterwards introduced into the areas around the Inner Gulf and on the southern coast. The Southerners are delighted with its ever increasing number, but the natives of Samut-songkram and Samut-sakorn have been complaining that tilapia is becoming a destructive pest to their shrimp farm business.

Regarding this matter the shrimp farm owners pointed out in a verbal communication that the spread of tilapias either by intentionally deliberate release or by escape from closed waters resulted in great harm to the production of shrimp in their farms. The fresh shrimps from the brackish water farms cost 15 to 20 baht per kilogram weight while the tilapia costs only 2–4 baht per equivalent weight.

The second kind of tilapia that came to Thailand is the *T. melanopleura* Dumer. It was brought from Belgium in 1957. This species was at first expected to be useful for aquatic weed control but they did not successfully serve that purpose. However, they are reported to be quite a popular food fish in the north and northeast sectors of Thailand.

The third species of tilapia received is the *Tilapia nilotica* Linnaeus. This is the most recent kind of fish which has been introduced into the country. It was on March 25, 1966, that the Japanese Crown Prince sent His Majesty the King of Thailand 50 fingerlings of *T. nilotica*. The fish have been kept in a pond within the Chitlada Palace and given a Thai name "pla-nin", or black fish, by His Majesty the King.

In five months these new tilapias grew big and bred rapidly. They were transfered to six new ponds where they further proliferated. On March 17, 1966, about 10,000 fingerlings measuring three to five cm were turned over to the Department of Fisheries to be transfered to 16 fishery experiment stations for further distribution. On March 21, 1966, one batch of 500 of these tilapias were for the first time propagated in one irrigation tank at Huahin by H.M. the King himself.

Larvicidal Fishes

To the second group of introduced species for larvicidal usage belong a few small sized fishes which were brought into this country for mosquito larvae control. Noteworthy among them is the *Gambusia holbrookii* (Girard) which was brought into Thailand from Palestine by one American lady in 1929. This fish is acclaimed to be a well tested destroyer of mosquito larvae. The fish is, as a matter of fact, native to the coastal waters of the United

Stated from New Jersey southward. The fish have been stocked and are reported to thrive very well and a great number of them have at one time resulted in the waters throughout Bangkok region.

Another larvicidal fish is the *Lebistes reticulatus* (Peters) commonly known as guppy. The time that this fish was introduced into Thailand is not definitely known. It was ordered by trade men purposely to be kept as a pet. This fish is well adapted to the local conditions and has turned out to be one of the most widely spread species in the Capital. The fish is regarded as nonpredacious and is very helpful in coping with the increasing number of mosquito larvae in the cosmopolitan area. This is not only because of the fishery workers but also because of the hygienists who took part in the distribution. The guppy has been multiplied into millions and an unlimited number of them could be easily obtained any time from the pools and canals in the capital and its neighborhood into which they were released.

The sail-fin molly, *Mollienesia latipinna* Le Sueur, is the third kind of larvicidal fish ever introduced. It was approximately in 1950 that this species was made available for sale in the local markets. Although found to be easily acclimatized the fish is not so well spread out in the natural waters.

Aquarium Fishes

Due to the nature loving habit and the comtemplative conception of life the Thai people are very fond of keeping ornamental fishes in small aquariums and at the same time using them for household decoration. This is another reason leading to the introduction of the third group of fishes for ornamental purposes. This third group of fishes was introduced into Thailand as early as 1865. At the present aquarium fish have become very popular and a great varieties of them were ordered from abroad. Some of these exogenous ornamental fishes may prove to be more productive and more efficient than species cultured elsewhere in ponds, and certain of them which gain quite a lot of popularity may be widely spread and very well established in ponds as well as in the natural waters.

Among the introduced foreign aquarium fishes (List D), very interesting are the species already known to be native to Thailand. Examples are the small cyprinids, popularly called by the name of tiger barb, sumatranus and sumatran, *Puntius tetrazona* (Bleeker), and the harlequin fish or rasbora, *Rasbora heteromorpha* Duncker. This may be explained by the fact that the fish traders do not know exactly about the fishes they order and that they are not well informed about the fish fauna of their own country.

It should be noted also that many of the indigenous fishes, especially those popular ones, get their new names in Thai. Many of the new fishes have been reported not hardy enough. Quite a number of them that were able to adapt themselves to local conditions became popular and spawned freely in aquaria or tanks. With the support of

modern means of transportation some fishes such as the Lebistes have been further spread out and have settled down successfully in some areas.

The most obvious of the introductions is the carrying into this country of fish known to be harmful ones. Appearing in the list of the introduced fish (List D) are three striking species of fishes of piscivorous nature: the paradise fish, *Macropodus opercularis* (Linnaeus) from South China and Korea; the Oscar's cichlid or velvet cichlid, *Astronotus ocellatus* (Cuvier) of Venezuella; and the fire-mouth cichlasoma, *Cichlasoma meeki* (Brind) from Ucatan. Some of these predacious animals, although intentionally kept as pets, may yet run wild after some time and prove a menace to the local fishes. There are many instances which show that the introduced species turn into destructive pests and cause grave harm after they have gotten loose from captivity and are living freely in the natural waters. Instances like this will occur anytime when there is no proper measure to control the importation by the merchants who do not care about the consequences.

OBJECTIVES AND SUGGESTIONS

Aside from the purposes of making an inventory of so far recorded which have been introduced into Thailand, and to describe in short their habits, productivity and properties, the author also wishes to include in this report these two main objectives: first, to discuss the present situation concerning the importation of various species of fishes; and, second, to draw attention to some of the problems which may be created by this human action in order that conservationists, fishery biologists and others may determine the supervisory measures which may be needed for preventing the unnecessary spreading of the introduced fishes of undesirable nature.

To be able to decide whether a new species should be introduced, a reasonable knowledge of ecological conditions as well as definite possibilities is necessary. In addition, the fish culturists should also consider that the desirability of the introduction of new fish depends on the yielding capacity and habits of that species. For example, the immense stock of tilapia, *T. mossambica*, now present in the Far East, is according to Schuster, descended from the five specimens caught in Blitar, East Java in 1939. The thousands of tons of fish now produced in Thailand where this fish was unknown not many years ago, clearly manifest how important is the transplantation activity for the development of fisheries in the country.

In order to increase the production of our waters in the most efficient way, the management requires the stocking of fish which are capable of better yield. The fisheries workers therefore prefer to select the suitable kind of fish for every condttion of water available. But very little has been investigated in order to get the thorough information about the reaction and the suitability of the species to be introduced or transplanted. The known properties of the species commonly used

for transplantation so far recorded are still far from complete. Many of them lack reliable data.

To eleminate the disadvantages that arise in consequence of the introduction of fish, intentionally or unintentionally, the following suggestions should be taken into consideration:

1. The necessity of studying the primary food-resources of our inland waters, their economic value and utilization before releasing the introduced fishes to compete with the native species.

2. The study of the density of predators of our own water as to determine whether or not it would permit the introduction of a new, prolific species of primary feeders that live mainly on the aquatic microfauna and flora.

3. Study the harmful result caused by the introduction of carnivorous fishes of prolific nature and of low economic value. These fishes would very soon predominate the valuable native species.

4. Study the disadvantageous effect that occurs in certain circumstance when the introduced fish becomes a keen competitor for food to better yield fishes.

5. Some introduced species may carry disastrous fish diseases such as enteritis in carps, fungus that causes gillrot, parasitic trematodes and nematodes, and bacteria that cause abdominal hydropsy in cyprinoid fishes. Dangerous infectious fish diseases could be spread over the country by these introduced fishes.

The interests involved in this matter are very great, therefore international cooperation in protecting indigenous fishes is highly necessary. For this problem alone, at least one or two fishery biologists should be needed and specially trained, and techniques in recognizing and protecting these fish diseases should be developed.

6. Since the introducing of miscellaneous fish into Thailand was so gradual that no completely adequate data can be given, it is suggested that the fisheries workers be alert in keeping watch on the introduction of fish into the country, and that necessary practical measures be applied. In addition, the necessity for very close cooperation between the countries within the same region in exchanging informations concerning this matter should be emphasized. Any introduction or transplantation can be done with reasonable assurance only when informations concerning the yielding capacity and the suitability for cultural purposes in the original country are available.

7. For ornamental fish, the supervision of importation should be carried out so that the fish can be inspected, at least to a certain limit, to prevent the carrying of bacterial diseases and parasites, and spreading of food competitors.

8. For economic or biological reasons the achievement of fishery biologists in intentionally propagating the waters with the indigenous fishes regarded as useful in a certain type of water may be considered advantageous, but the

transplantations of fish of certain varieties that have been unintentionally spread to areas outside the planned region of distribution should be carefully studied.

In conclusion the author wishes to draw more attention to problems that may arise from the introduction of foreign fishes. He also would like to stress the importance of a continuation of the study of the biology and habits of the introduced fishes for the improvement of the record, and to promote a plan into which further information can easily be incorporated. Research in this phase of fisheries can be very productive for information valuable not only to Thailand but to much of the rest of the world as well.

SUMMARY

The fishery resources of Thailand are plentiful and kinds of fish are varied. In spite of this fact, a number of exotic species of fish have been introduced into this country such as the gold fish, *Carassius auratus* (Linnaeus) for ornamental purposes and the carp, *Cyprinus carpio* (Linnaeus), for food purposes. The gold fish was found in Thailand as early as 1865 but the carp was not definitely known until 1937 when it was noted by Fowler.

The species most recently introduced is one of the tilapias, *Tilapia nilotica* Linnaeus given as gift from the crown Prince of Japan to His Majesty the King of Thailand in 1966.

Recent surveys indicate that at least 14 families comprising not less than 68 species of fishes have been introduced into Thailand. A provisional list of the scientific name, record of origin, and the year of introduction of each of these fish has been compiled and is presented herewith.

Many imported fishes, especially the common carp, have been successfully grown in ponds and have become common food fish in Thailand today. An exceedingly successful transplant has been the Tilapia, *T. mossambica* Peters. Some of these fish have escaped from captivity. Since there is nothing to prevent their ultimate dispersal, these, and many others intentionally released in public waters, have gained access to open waters along the coastal areas in the Gulf of Thailand. The paper includes information regarding the advantages and disadvantages from the transplantation of some of the fishes.

The objectives of this paper are: firstly, to discuss the present situation concerning the importation of various species of fishes; and, secondly, to draw attention to some of the problems which may be created by this human action in order that conservationists, fishery biologists and others may determine the supervisory measures which may be needed to prevent unnecessary spreading of the introduced animals of undersirable nature.

International cooperation in exchanging information concerning the yielding capacity of commonly imported species, their suitability for cultural and

ornamental purposes as well as benefits and problems resulting from such transplantations is urged by the author.

สรุป

ทรัพยากรสัตว์น้ำของประเทศไทยมีอุดมสมบูรณ์ และชนิดของปลาต่าง ๆ ก็มีหลากหลาย แต่แม้กระนั้นก็ได้มีการนำปลาจากต่างแดนหลายสิบชนิดเข้ามายังประเทศไทย เช่น ปลาทอง *Carassius auratus* (Linnaeus) สำหรับเลี้ยงเพื่อประดับบ้านให้สวยงาม และปลาไน *Cyprinus carpio* (Linnaeus) สำหรับเลี้ยงเพื่อใช้เป็นอาหาร ปลาทองนั้นมีประวัติปรากฏในประเทศไทยเริ่มตั้งแต่ปี พ.ศ. ๒๔๐๘ ส่วนปลาไนนั้นไม่ทราบแน่ชัดจนกระทั่งปี พ.ศ. ๒๔๘๐ คือ เมื่อ มร. ฟาวเลอร์ได้บันทึกข้อสังเกตเอาไว้

ชนิดปลาที่นำเข้าประเทศล่าสุด คือปลาทิลาเปียชนิดหนึ่งชื่อ *Tilapia nilotica* Linnaeus ซึ่งเป็นเครื่องราชบรรณาการจากองค์มกุฎราชกุมารแห่งประเทศญี่ปุ่นนำขึ้นทูลเกล้า ฯ ถวายพระบาทสมเด็จพระเจ้าอยู่หัวเมื่อปี พ.ศ. ๒๕๐๙ และได้ทรงพระกรุณาโปรดเกล้า ฯ พระราชทานนามว่า "ปลานิล"

การสำรวจที่กระทำเมื่อเร็ว ๆ นี้แสดงว่าพันธุ์ปลาที่ได้นำเข้าประเทศไทยแล้วนั้นมีอย่างน้อย ๑๔ ตระกูล รวมแล้วไม่ต่ำกว่า ๖๘ ชนิดด้วยกัน ดังบัญชีแสดงรายการชื่อวิทยาศาสตร์หลักฐานและปีที่นำเข้า ซึ่งได้แนบมาท้ายเรื่อง

ปลาที่นำมาจากต่างประเทศหลายชนิด โดยเฉพาะพวกปลาตะเพียน ได้รับการเพาะเลี้ยงเป็นผลสำเร็จด้วยดีจนกลายเป็นปลาอาหารสามัญในประเทศไทยทุกวันนี้ ตัวอย่างปลาที่นำมาเลี้ยงแล้วให้ผลสำเร็จดีเกินคาด คือ ปลาทิลาเปีย *Tilapia mossambica* Peters ปลานี้ได้หนีจากบ่อเลี้ยงไปบ้าง เนื่องจากไม่มีอุปสรรคใดขัดขวางการแพร่พันธุ์ของมัน ปลานี้และอื่น ๆ อีกหลายชนิดที่ถูกนำมาปล่อยตามแหล่งน้ำสาธารณะจึงได้แพร่ออกไปถึงน่านน้ำชายฝั่งทั่วอ่าวไทย ในบทความเรื่องนี้ได้บรรยายถึงข้อดีและข้อเสียของการนำปลาบางชนิดเข้ามาปล่อย

จุดประสงค์ขั้นต้นของการเสนอเรื่องนี้คือเพื่อวิจารณ์สถานการณ์ปัจจุบันเกี่ยวกับการนำปลาชนิดต่าง ๆ เข้าประเทศไทย และขั้นต่อไป คือเพื่อหยิบยกปัญหาต่าง ๆ อันน่าได้ใส่ใจ ปัญหาอันอาจเกิดขึ้นจากพฤติการณ์ของมนุษย์เรา เพื่อที่ว่านักอนุรักษ์วิทยา นักชีววิทยาประมง และบุคคลอื่น ๆ ที่เกี่ยวข้องอาจได้ใช้ประโยชน์นำไปประกอบการพิจารณาในการจัดมาตรการควบคุม ซึ่งอาจ

จำเป็นต้องใช้สำหรับป้องกันการแพร่หลายโดยไม่สมควรของสัตว์อันไม่พึงปรารถนาจากประเทศอื่น

สิ่งที่ผู้เขียนปรารถนาใคร่ได้เห็นการปฏิบัติ คือการร่วมมือระหว่างประเทศในการแลกเปลี่ยนข้อเท็จจริงต่าง ๆ ว่าด้วยความสามารถผลิตของชนิดปลาที่นำเข้าประเทศ ว่าด้วยความเหมาะสมสำหรับใช้เพาะเลี้ยง หรือใช้ประดับเพื่อสวยงาม และรวมถึงคุณประโยชน์กับปัญหาอันสืบเนื่องมาจากการโยกย้ายถิ่นฐานของปลานั้น ๆ.

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