NOV 1970

SCIENCE BULLETIN

National Science Council
214 Roosevelt Road, Section III
Taipei, Republic of China

NSC-NSF Joint Executive Committee Compare Notes on Binational Program

The Joint Executive Committee of the National Science Council (NSC) of the Republic of China and National Science Foundation (NSF) of the United States held its first annual meeting in Taipei October 12 through 13. Dr. Henry Birnbaum, NSF resident representative in Tokyo, and his deputy, Dr. Arthur Findeis, represented the U.S. side. The delegates to the meeting reviewed the various activities last year and noted with satisfaction the progress made, and exchanged opinions with a view to making further refinement with the procedural guidelines for the U.S.China Cooperative Science Program.

It is agreed that for visiting American scientists (both long-term and short-term), a simplified procedure should be devised for their visa to visit Taiwan. The Ministry of Foreign Affairs of the Republic of China, whose representative participated in the meeting, indicated that in the future all American visiting scientists may immediately obtain a tourist visa to come to Taiwan. The tourist visa is valid for one month and may be renewed for another month. For those who will stay in Taiwan for a longer duration, the NSC will take care of changing their tourist visa into entry visa.

It is also agreed that visiting American scientists should be supplied with as much information as possible regarding Taiwan before their arrival so that they can settle down and start work in short order. The NSC will undertake to prepare a manual for the visitors. All parties concerned feel that previous knowledge and experience with Taiwan is rather important to the adjustment which visitors must make in a foreign country. Therefore, preference should be given to long-term visiting scientists with such knowledge and experience who apply for a stay of less than half a year.

It is proposed that, inasmuch as a large number of American scientists visit Japan every year, NSF's Tokyo office should be authorized to award short-term visits to Taiwan.

Whereas the procedural guideline for long-term visitors sets forth that any member of the permanent scientific community of either country may qualify for submission of proposals, it is agreed that normally a scientist must have worked for five or more years in a qualified research/educational institution before he can be considered as a member of the permanent scientific community. The Joint Executive Committee has reached this interpretation partially because of the large number of inquiries received to-date.

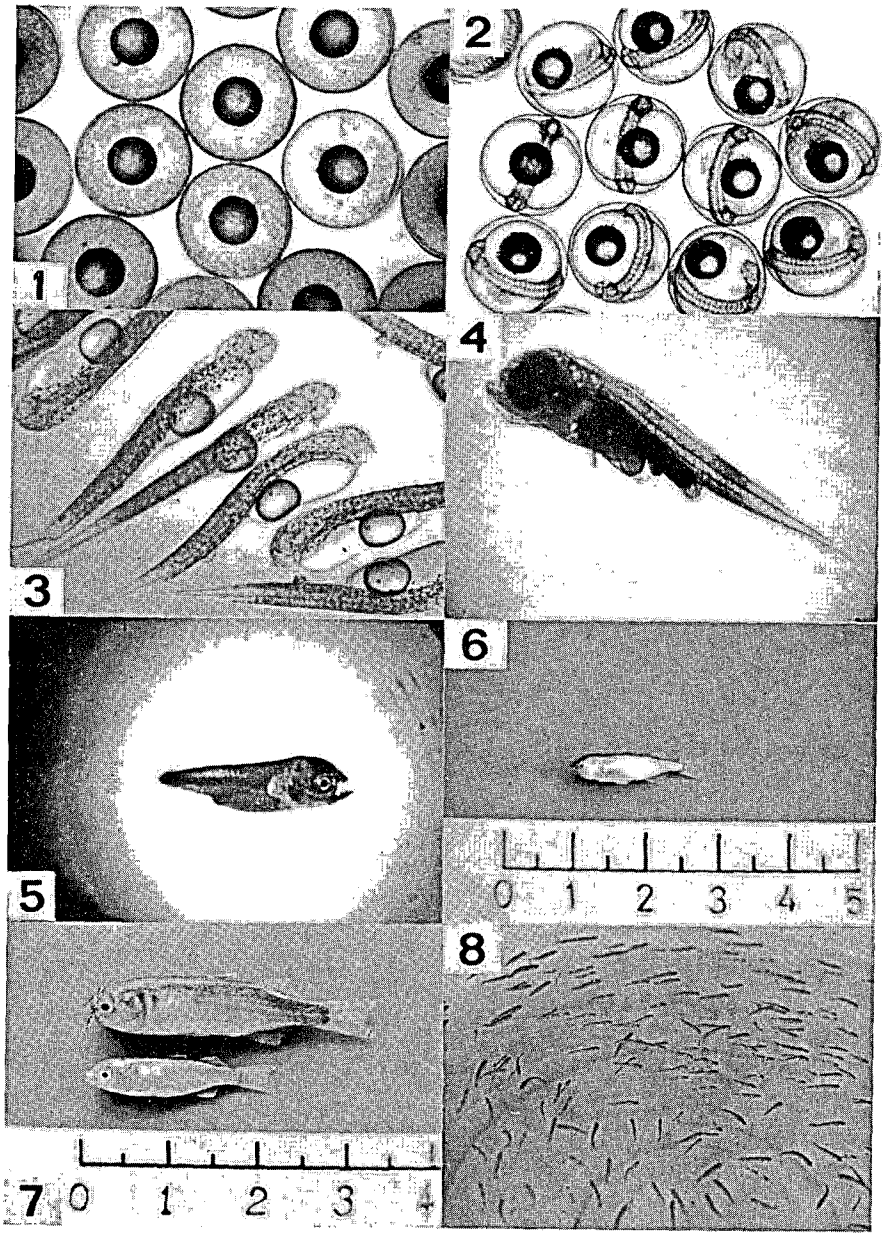
The Joint Executive Committee has noted that there are a number of parallel programs on the exchange of scientists between the United States and the Republic of China and wishes to clarify that the U.S.-China Cooperative Science Program is not to be linked with other existing programs. For example, whereas an American scientist may apply for appointment both under the U.S.-China Cooperative Science Program and the NSC's visiting professorship program, but he can accept only one appointment. Those who have been appointed as an NSC visiting professor and request the NSF to award a stipend in addition to the visiting professor's stipend cannot be considered.

(*Continued on page* 4)

Dr. Henry Birnbaum, fourth from right, and Dr. Arthur Findeis, third from right, mingle with long-term visiting scientists and NSC officials at a social gathering in Taipei. NSC Vice Chairman M. C. Chang, second from left, and NSC Deputy Secretary General Wang Chi-wu, holding glass, were hosts of the occassion.

Experiments on Induced Breeding of the Grey Mullet, Mugil Cephalus *Linnaeus*

by Dr. I C. Liao



PLATE

Fig. 1 Eggs just after spawning
Fig. 2 Brain differentiation stage
Fig. 3 8-10 hours after hatching
Fig. 4 13 days after hatching (3.85 mm in length)
Fig. 5 20 days after hatching (7.65 mm in length)
Fig. 6 33 days after hatching (1.88 cm in length)
Fig. 7 The comparison of artificially propagated fingerling (above; 45 days after hatching) with natural fingerling (below)
Fig. 8 Swimming fry in the tank

We all know that the grey mullet, *Mugil cephalus* Linnaeus, is one of the important commercial fishes in Taiwan, especially famous for its roe. Because of the shortage of fingerlings supply for pond culture, Taiwan Fisheries Research Institute, The Institute of Fishery Biology of National Taiwan niversity and Taiwan Fisheries Bureau had united together to proceed the experiments on the propagation of mullet in each winter since 1963. The main purpose of this is in order to supply enough fingerlings to the fish farmers. The fisheries culture research fellows of the Rockefeller Foundation's Fish Culture Research Project in Taiwan and Dr. Shao-wen Lin of FAO Regional Office, Bangkok, Thailand, participated in the experiment in 1968, and the work was shifted to Tungkang Marine Laboratory (also known as Tungkang Shrimp Culture Center). In the winter of 1969 Dr. Ziad H. Shehadeh of The Oceanic Institute, Makapuu Oceanic Center, Hawaii, U.S.A. came and worked with the team and made many valuable contributions. The primary success of the experiments was carried out between December 19 and January 11 with a total of 19 of which 12 ovulated successfully and 9 of them hatched. The hatching rate was 47.7% which was more than four times that of the previous year. A total of 431 larvae survived, which measured 3.28 cm and weighed 0.34 g on the the 45th day, and were robust and strong with high environmental resistance, suitable for stocking in the pond. The summary of the report in the experiments is given as follows:

1) The 19 spawners were captured by professional fishermen, during the time of the spawning migration of the fish, near the coast of Tungkang. The research men selected the male and female and examined the maturity. Then, after being put into the plastic bags of 60cm X 90cm, filled with 30 liters of sea water and inflated with oxygen, the fish were taken ashore

to the stock tanks.

2) It is best to give the first injection of hormonal treatment within one hour after stocking in the tanks and the second one within the next twenty-four hours. The total dosage for each female was 2.75 to 5 mullet pituitary glands, mixed with 20 to 50 R.U. (rabbit unit) of Synahorin. The spawners should be netted and examined every one to two hours to pay attention to the possibility of ovulation. Fortunately, 12 spawners ovulated (63.2%) and the eggs from 9 of them hatched (47.7%). It was the most successful experiment in the last six years.

3) Fertilization was generally carried out by the dry method. The fertilization rate varied from 20 to 90%, averaging less than 70%.

4) Both the flowing water type and non-flowing type of hatching were used in round plastic tanks of 0.5 and 1.0 ton in size. It took 34 to 38 hours to hatch at water temperature of 23-24.5°C and 49-54 hours at 22.5-23.7°C with a salinity of 30.1-33.8% in both cases. Generally, the hatching rate was high.

5) Seasoned and stable sea water was used in rearing, and was freshened gradually. More rapid freshening was made on the sixth day after hatching, with salinity reduced from 32.8% to 4.15% within forty five days.

6) The larvae were reared either indoors or outdoors. Plastic tanks of 0.5 ton were used indoors and large tanks of 5m X 7m X 1.5m were used outdoors. The newly hatched larvae measured 2.08-3.40mm and were unable to swim actively. The food supply was modified according to the development of the larvae. Artificially fertilized oyster eggs, rotifers, copepods and *Artemia* nauplii were used in this order. The amount of food given depended on the amount consumed.

7) A total of 431 larvae survived on the forty-fifth day. Those reared in small tanks had a survival rate of 0.31%. Those reared in large tanks had a survival rate of 0.75%. They weighed 0.34g and were 3.28 cm in leigth, about 1.5 times larger than the larvae collected in natural water and had high environmental resistance. The reared larvae were divided into several groups and stocked in fish ponds and tanks. The best result obtained on the 200th day after hatching was 28.1 cm in length and 217.4g in weight.

ROC, ROK Seeking Cooperation in Science&Technology

The Republic of China and Republic of Korea, partners and friendly competitors in the field of economic development, are trying to forge a new bond through cooperation in science and technology.

Aside from their ethnical and cultural afinity, the two countries have much in common in other respects. Both are developing nations marked by high economic growth rate and are eager to learn from each other's experience in further accelerating that growth. In recent years the two countries have been actively cooperating in the trade field too.

Dr. U.S. Choi, president of the Korean Institute of Science and Technology (KIST), arrived in Taipei last months for an initial exchange of views with interested Chinese authorities regarding the new cooperation scheme. Chinese discussants included Vice Economic Minister K. S. Chang, NSC Vice Chairman M. C. Chang, J. T. Shen of IECD, Willington Y. W. Tsao of the same organization, M. H. Po, director of MRSO, and Dr. Paul L. C. Hao, director the Union Industrial Research Institute.

Both sides felt the desirability of the cooperation. A broad line of cooperation was agreed upon and has been submitted to the respective governments for decision. Details will be worked out once the idea is approved by higher authorities.

Aeronautic Engineer Appointed Science Counsellor at D.C.

Mr. Hsueh-chang Pan, formerly chief of the Development Financing Division, Council for International Economic Cooperation and Development (CIECD), left for the United States at the end of October to assume his new duties as science counsellor of the Chinese Embassy in Washington.

An aeronautical engineer by training, Mr. Pan served in the Chinese Air Force for may years. His long association with CIECD had made him familiar with the various phases of the industrial development in Taiwan.

Mr. Pan is the first science counsellor in China's diplomatic missions abroad. The post was created recently in view of the expanding activities now unfolding under the U.S. China Cooperative Science Program. Dr. Bruce Billings, special assistant to the American ambassador for science and technology, has made himself immensely valuable in the implementation of the program. It is hoped that Mr. Pan's new assignment will help smooth things stateside.

Mr. Pan will have a lot to do in his new job. Besides maintaining close contact with private foundations, universities and research laboratories of major U.S. concerns, he will keep a channel open with interested American government agencies, especially the National Science Foundation. He is also expected to play a major role in the recruitment of Chinese scientists in the United States for various assignments in Taiwan.

Mr. Hsueh-chang Pan

Taiwan to Initiate Typhoon Study

The geographic location of Taiwan is both a boon and a curse to the island economically. Its subtropical climate and bountiful rainfall provide optimum condition for agricultural production. On the other hand, the island is at the mercy of a long typhoon season stretching from May to October. Late Pacific howlers have been known to pound at the island as late as November. The devastation of typhoon and the resulting floods is often staggering. During the past twenty years Taiwan has suffered from quite a few crippling blows in the howling storms with houses destroyed, bridges washed out, roads and farms buried under tons of mud. Since the National Science Council underwent a reorganization last year, it has adopted a policy to make a massive effort in selected areas of research which will have a large bearing, directly or indirectly, on the economic life of the country. The study of typhoon and its damage, the possibility of reducing the damage through better weather forccast and flood warning is one of the major areas to which NSC is directing its attention.

Dr. Ta-you Wu, chairman of NSC, has been in touch with Dr. C. C. Chang, chairman of the Department of Space and Atmospheric Sciences, Catholic University of America, regarding the typhoon study project. Dr. Chang has been known internationally for his study in tornados nnd hurricanes. At the same time, a number of scientists including those in the fields of meteorology, aerodynamics, thermodynamics, fluid mechanics, etc., are being organized in Taiwan to form the nucleus of a task force to undertake the research. Both Academia Sinica and the National Taiwan University have indicated keen interest to participate in the project.

Dr. C. C. Chang has proposed to work with Chinese scientists in Taiwan on cooperative basis. The project will start with experiments on an analytical. model to test an island's interference with the progress of typhoon. As a leading authority in this type of research, Dr. Chang has proposed to help supervise the design-making, calibrating, and testing of such an analytical model in his laboratory at Washington D. C. The model will be shipped to Taiwan and installed for a full range of tests under simulated conditions. Data thus obtained will be used to build a numerical model and for computer studies.

The next stage will be the refinement of the model through data obtained by Taiwan's radar weather stations and by weather satellite pictures. It is hoped that a highly developed model can be hooked up with the radar weather stations to form a much refined and precise typhoon forecast system.

At the same time efforts will be made to improve micrometeorology observations and measurements throughout Taiwan. The forming of such a modern system may provide an early and accurate warning on any onrushing typhoon and the resultant flood. It is not unreasonable to hope that typhoon damage can be substantially reduced through a modern network for weather forecast.

NSC has invited Dr. C. C. Chang to visit Taiwan in December. He will spend about one month here to work with Chinese scientists for a concrete plan. It has been suggested that basic equipment be ordered early next year, and that the project be actually launched by September, 1971. A number of outstanding young Chinese scientists, including Drs. Wang Chun-tsung, Wang Huai-chu, and Peng Li, have shown a great deal of enthusiasm for this project.

Wanted: Advice of Food Scientists

The Food Processing Institute at Hsinchu (see *Science Bulletin* Vol. 2 No. 10) is looking for consulting correspondents experienced in (1) starch & modified starch, and (2) sugar & inverted sugars. The task of the correspondents is to tell the Institute where to look for reference materials and to offer advice regarding research efforts on topics specified by the Institute itself. Remuneration of the correspondents is to be arranged between the concerned parties on piecemeal basis. Interested scientists may write to:

Food Processing Institute
10 Kuang Chen Li
Hsi Ta Road, Hsinchu
Taiwan, Republic of China

NSC-NSF Joint Executive Committee

(Continued from Page 1)

Regarding cooperative research. the Joint Executive Committee notes that, because of budget limit on both sides, any proposal should not extend beyond a two-year period. For practical considerations, visits made under the cooperative research projects should normally be three months or less each time. The Committee also contemplates the beneficial effects of cooperative research grown out of long-term visits.

On the question of binational seminar, the Committee agrees that efforts should be directed to the holding of workshop type of seminars and to avoid formally structured conferences so as to maximize their usefulness and their present condition.

The Joint Executive Committee notes with pleasure that organizational work for the proposed U.S.-China Conference on Oceanography in Taipei, the first binational seminar under the U.S.-China Cooperative Science Program, has been progressing well, the format of the conference has been agreed to in principle, and the date for the Conference tentatively set at April 28 through May 7, 1971.

The Chinese members of the Joint Executive Committee indicated that they are highly pleased by the selection of the seven high-caliber American scientists as long-term visiting scientists to Taiwan in this academic semester. The NSF representatives noted with pleasure of the NSC's policy of sending promising young Chinese scientists who have finished course work for their Ph.D. to the United States as long-term visitors for the purpose of performing their doctoral dissertation research. When appropriate, NSF would do everything possible to assist such scientists in locating American host organizations.

The NSF representatives indicated they appreciate the appointment of a science counsellor in the Chinese Embassy in Washington D.C. The Joint Executive Committee believes that this would improve the liaison between the two implementing agencies. At the same time it is proposed that NSF representatives, either from Washington D.C. or Tokyo, make more frequent visits to Taipei in the future.