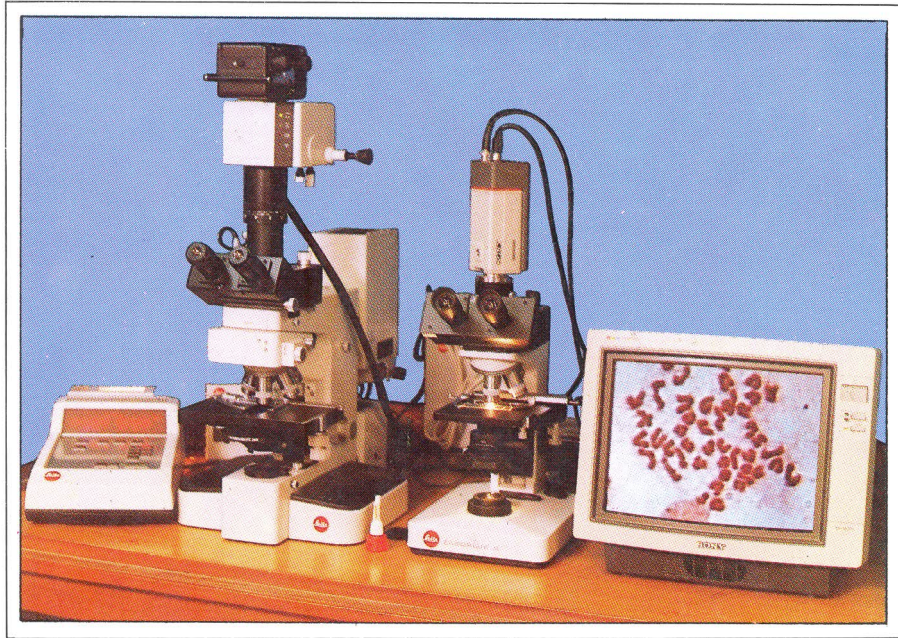


# PME CELL



वार्षिक रिपोर्ट

Annual Report 1990-91



**NATIONAL BUREAU OF FISH GENETIC RESOURCES**

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*Sophisticated Microscopy system for Cytogenetic Research*

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# 1. INTRODUCTION

## 1.1 Brief History

In view of the national programmes for improvement and expansion of both inland and marine fisheries of the country, it has been recognised that enhancement of fish production alone is not enough and conservation of the diversity of the natural fish populations is a necessary prerequisite. Appreciating this, the Government of India approved establishment of the Bureau at the end of the Sixth Five Year Plan.

The National Bureau of Fish Genetic Resources was sanctioned in December 1983 under the Indian Council of Agricultural Research.

## 1.2 Mandate

The mandate of the Bureau includes collection, classification and evaluation of information on fish genetic resources of the country, cataloguing of genotypes, maintenance and preservation of fish genetic materials, introduction of exotic species in Indian waters and conservation of endangered species.

## 1.3. Organisation

The organisational set up of the Bureau was structured for meeting the objectives. Four centres have been approved in order to take up work on different resources. These are (i) Freshwater resource centre, located at the headquarters of the Bureau (ii) Brackishwater resource centre to be located at the headquarters of the Central Institute of Brackishwater Aquaculture (iii) Marine resource centre will be located at the Central Marine Fisheries Research Institute at Cochin (iv) Coldwater resource centre will be located at the headquarters of the National Research Centre for Coldwater Fisheries.

The following subject matter sections have been set up at the headquarters of the Bureau at Allahabad which would be elevated to the status of Divisions during the VIII Plan period.

- i) Cytogenetics
- ii) Biochemical Genetics
- iii) Biology
- iv) Conservation and Management

## 1.4 Staff Position

The overall staff position as on 31 March 1991 is given below :

Sl. No.	Category of Posts	Posts sanctioned (No.)	Posts created (No.)	Staff in position	Posts vacant (out of created posts)
1	2	3	4	5	6
1.	Research Management (Director)	1	1	1	—
2.	Scientific	26	15	9*	6
3.	Technical	35	18	18	—
4.	Administrative	15	9	9**	—
5.	Auxiliary	2	2	2	—
6.	Supporting	29	13	13	—
	Total	108	58	52	6

\* Includes one scientist on deputation to N.E.C., Shillong.

\*\* Includes one senior clerk on deputation to K.V.K., Kanpur.

## 1.5 Finance

Allocation of fund and expenditure incurred during the year 1990-91

Plan/Non-Plan	Allocation (Rs. in lakhs)	Expenditure (Rs. in lakhs)
Plan	50.00	19.08
Non-Plan	20.00	19.73
Total	70.00	38.81



## 2. RESEARCH ACHIEVEMENTS



1. Temporary Field Laboratory for cryopreservation of milt.

### 2.1 CM.3. Cryopreservation of Fish Spermatozoa

L.B. Singh, A.G. Ponniah, P.C. Mahanta  
P.K. Sahoo, A. Barat &  
A. Gopalakrishnan.

For developing the Gene Bank, (Fig.1) trials on cryopreservation of milt of

commercially important species including endangered carp continued during the year with conspicuous achievements as below.

Experiments on cryopreservation of spermatozoa of *Labeo rohita* (Rohu) and *Cyprinus carpio* var. *communis* (common carp) were continued during the period under report. Milt collections were also



made from other Indian major carps, *Catla catla*, *Cirrhinus mrigala* & mahseer, *Tor khudree*. Testing of sodium chloride bicarbonate and sodium chloride citrate as Extender I & II respectively were repeated. Along with glycerol, DMSO was also evaluated as cryoprotectant. Experiment with Extender II showed success including genetic viability of the cryopreserved milt. Relevant details of the experiments are as below. (Fig.2)



2. Cryocans containing carp milt.

### Trials on Indian Major Carps

During the period under report the milt of *Labeo rohita*, cryopreserved during August 1989 was monitored periodically in regard to its activity: The motility of the sperms ranged from 60-80% with both the extenders during the year of observation. After 11 months, fertility trials were carried out at the State Fisheries Corporation

Hatchery at Amethi in July 1990.

For the fertility trials, two sets of experiments were carried out. In each experiment, the eggs stripped from a single female fish were divided into different batches. They were separately fertilised with cryopreserved milt with Extender I, Extender II & fresh milt which served as the control.

In the first set of experiments, there was no fertilization even with the fresh milt indicating that the breeding failure was not due to the cryopreserved milt but due to other factors.

In the second experiment, the hatching rate was 13.7% in the batches of eggs fertilised with cryopreserved milt with Extender II against 30.9% with the normal milt. This proves the genetic viability of the cryopreserved milt with Extender II. However, no hatchlings were obtained from the eggs fertilised by cryopreserved milt with Extender I.

There were no significant differences in growth rate between the fry produced from cryopreserved milt and normal milt. Only one specimen, out of many, obtained from the cryopreserved milt had a curved spinal deformity which need not necessarily be connected to cryopreservation.

Collection of milt of rohu, mrigal and catla were also carried out at Amethi and Tendua Fish Farms of U.P. using Extenders I & II and cryopreserved using Glycerol and



DMSO as the cryoprotectants.

### **Trials on Mahseer**

Milt of Mahseer, *Tor khudree* was collected from matured fishes of the fish farm of the Tata Electrical Company at Lonavla in Maharashtra. The milt thus collected were mixed with Extender I and II separately and cryopreserved. After cryopreservation for 24 hours fertility trials were carried out using females caught from the lake. Fertilization was observed in the control in which freshly stripped eggs and milt were mixed. But, cryopreserved milt failed to fertilize another portion of eggs from the same female.

Mahseer hybrid (*T. khudree* x *T. tor*) milt had been subsequently collected and cryopreserved with a modified equilibrium time and gradual addition of cryoprotectants. Such cryopreserved milt continued showing motility rates ranging from 60-80% indicating success.

### **Trials on Common Carp**

The milt collections made in March 1990 and cryopreserved using Extender II with glycerol and DMSO were periodically monitored for their motility. About 50% of the milt were motile during the period of observation.

The milt cryopreserved for more than 12 months were tested in fertility trials in the laboratory. Female specimens of common carp collected from the State farm were induced to spawn through hypophysation with carp pituitary. The eggs collected by stripping were fertilized with cryopreserved

milt. Normal milt was used in the control. Two females could be bred with cryopreserved milt in which Glycerol was used as Extender. The hatching in these cases were 0.2% & 1.1% respectively.

In a third female the cryopreserved milt gave a hatching percentage of 0.66% and 0.65% with one and two year old milt. The average hatching rate of all the control females was 32.4%. The milt with DMSO as extender, however, failed to produce any hatchling in all the three females.

## **2.2 FB.1. Cataloguing of Fish Genetic Resources of India**

P.C. Mahanta, D. Kapoor, S.P. Singh, A.K. Singh, R. Dayal, S.M. Srivastava, R. S. Patiyal and K.D. Joshi.

Aiming at preparation of a catalogue of fish germplasm resources, the studies included collection of information on population structure and present abundance of economically important freshwater fish species of Ganga river system and also listing of endangered, threatened and rare fish species.

### **i) Cataloguing of information on Fish Genetic Resources of India**

A preliminary list earlier compiled and prepared by the Bureau had been upgraded by adding more Brackishwater fishes. The list now includes a total of 1483 species, consisting of 67 Coldwater (4.53%), 450 Warmwater (30.34%), 139 Brackishwater (9.37%) and 827 marine (55.76%) species.

Detailed information on identity, taxonomy, distribution, bionomics, life history, fishery, aquaculture, genetics and status of conservation on 89 commercially important fish species were collected from different published information in the proforma prepared for the cataloguing. The collected information was stored in PC hard disk for easy retrieval and future use.

## ii) Listing of endangered, threatened and rare species

With a view to finalising the already prepared list of endangered, threatened and rare fish species, more information regarding their availability etc. were collected.

## iii) Survey of deep pools

The work was undertaken in collaboration with the Riverine Division of the Central Inland Capture Fisheries Research Institute.

Available information were collected for 36 deep pools which are as follows. In Yamuna, between Okhla barrage to Agra, 3 deep pools i.e. Sakraya Jheel at Mathura, Kailash pool & Poiyyaghat near Agra were surveyed and preliminary information collected. Along the 120 km. long stretch of River Yamuna from Rajapur to Allahabad 6 deep pools were charted.

Further down on the river Ganga from Allahabad to Varanasi 23 deep pools were charted out. Near Patna one pool was located in Ganga. Near Bhagalpur 5 deep pools were reported.

Two deep pools near Allahabad, one in Ganga and another in Yamuna, were selected for detailed study on the location, type, topographical feature, fish and fisheries etc., for developing strategies to conserve fish genetic resources in such pools. The depth of the pools range from 8-18 metres with length varying from 125 m to 195 m. Further studies are in progress.

## 2.3 FB.2. Conservation of Mahseer in North and North East Hills

D. Kapoor, P.C. Mahanta, S.P. Singh, A.K. Singh, R. Dayal, S.M. Srivastava, R.S. Patiyal & K.D. Joshi

### Present status of mahseer resources

With a view to ascertaining the status of mahseer resources in U.P., H.P. and N.E. regions of the country and to formulate appropriate conservation strategies, some pertinent data were gathered through the various sources including respective State Government Departments. Almost simultaneously, a reconnaissance survey was also undertaken in a few areas. The status of mahseer in the above regions, as revealed in the above study, is highlighted below.

### U.P. hills

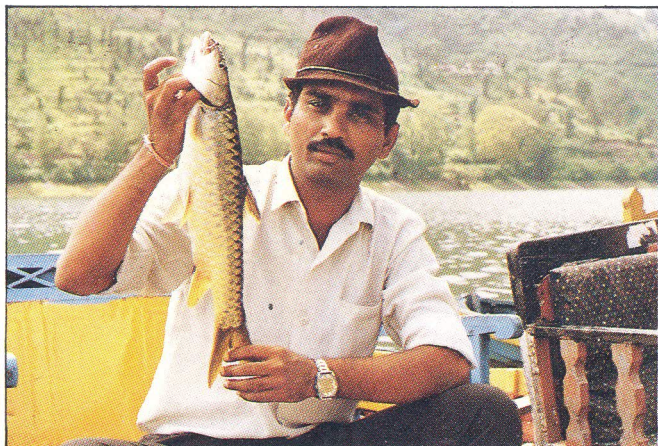
The species available in the regions are:

*Tor tor*

*Tor putitora*

The data on the mahseer landing from the Bhimtal lake of about 213 acres with depth from 80'-150', Naukuchia tal of 160 acres (depth 90'-155') and Sat tal of 102 acres





3. Endangered Mahseer, *Tor putitora*, of the Bhimtal lake.

(depth 65'-80'), situated in Nainital district were collected. The total mahseer landing from the above 3 lakes were recorded as below: (Fig.3)

Year	Catch in quintals
1982-83	8.92
1983-84	6.35
1984-85	5.03
1985-86	—
1986-87	4.33
1987-88	—
1988-89	—
1989-90	4.16

The licences for angling of these fishes at the above lakes are issued by the Department of Fisheries, U.P. The data shows that while 1372 licences were issued during the year 1979-80, it was increased to 3441 during 1989-90 indicating the increased fishing effort in the lakes.

With a view to coping with the increased angling effort & fishing by gill net at the

lakes, the U.P. State Fisheries has been regularly breeding the mahseer and stocking with juveniles from 1978-79 in Bhimtal lake, 1981-82 in Naukuchiyatal.

From Bhimtal lake the total fish landing was recorded as below :

Year	Landing in kg.
1957-58	1509
1982-83	1064
1989-90	663

In spite of an effort of replenishing the mahseer stock through restocking with young fishes and even after increasing the fishing effort by 250% the reduction in catch is an indication of the declining trend of the fish in U.P. hill areas.

### Himachal Pradesh

Two main rivers traverse the whole of the Himachal Pradesh i.e. Beas and Satlaj with two reservoirs viz., Pong in Kangra district and Govindsagar in Bilaspur district.

The available data on mahseer landing in the reservoirs are as follows

#### Pong reservoir (Species : *T. putitora*)

Year	% of Mahseer in total landing
1984-85	18.0
1985-86	17.8
1986-87	13.8
1987-88	10.9

**Govindsagar reservoir (Species : *T. putitora*)**

1984-85	8.9
1985-86	8.2
1986-87	—
1987-88	6.1
1988-89	4.1

Though there is increase in fishing effort for mahseer in both the reservoirs, the programme of stocking of seed for stock replenishment is yet to be taken up.

The above data shows that in Pong reservoir there is a decline in percentage of mahseer catch/landing from 18.0% in 1984-85 to 10.9% in 1987-88 and in Gobindsagar also there is a decline in percentage of mahseer landing from 8.9% in 1984-85 to 4.1% in 1988-89. The data indicate that percentage of mahseer is declining in both the reservoirs warranting an early action on the matter.

The Govt. of Himachal Pradesh has already declared closed season and restriction in fishing in other seasons in some of their water bodies. They are also considering declaring sanctuaries in Sidhpur (Mandi district), Renuka lake in Kangra district, Baijnath and Chandratat in Kangra district.

**North East Region**

The mahseer landing data from Meghalaya, Assam and Arunachal Pradesh were also collected and compiled which are as below :

**Meghalaya**

Year	% of Mahseer
1985-86	2.69
1986-87	—
1987-88	2.49
1988-89	1.99

There were 3 species of mahseer available in the area which are *Tot tor*, *Tor putitora* and *Accrossocheilus hexagonolepis* and the above landing data is a combined one for all the species.

**Arunachal Pradesh**

Year	% of Mahseer
1985-86	2.50
1986-87	2.18
1987-88	1.83
1988-89	1.58

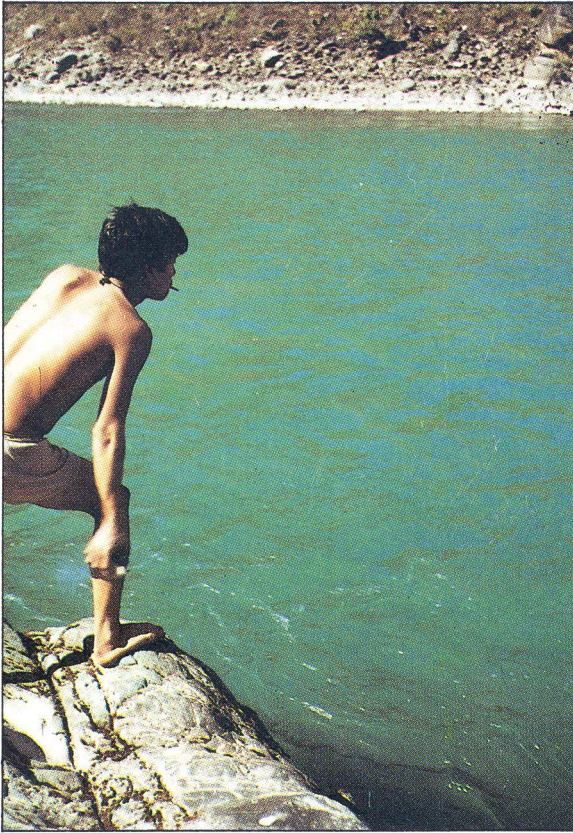
The species available in the state are *Tor tor*, *T. putitora* and *A. hexagonolopis*.

**Assam (Jorhat landing centre)**

Year	Total catch of Mahseer in kg.
1987	774
1988	532
1989	300

The species available in the region are *Tor tor* and *Tor putitora*.





4. Illegal fishing by dynamiting in river Kali (U.P.).

The above data show that in course of about 3 years period during the last decade, the mahseer catch had been reduced to less than half:

The causative factors leading to decline of mahseer in the *north* (Fig.4) and north-eastern states would be investigated and conservation strategies suggested for the respective states.

#### 2.4 CM.5 Production of Monosex and Sterile Populations

P. Das, W.S. Lakra & A.K. Singh

The project aims at standardisation of method/technique for sex reversal of fishes for introduction of exotics in nature without altering the ecological balance, yet enhancing production of fish directly. Fresh broodstock of *Oreochromis mossambicus* were procured and maintained in the wet lab under controlled conditions (Fig.5). In



5. Tilapia spawners used in experiments for monosex production.

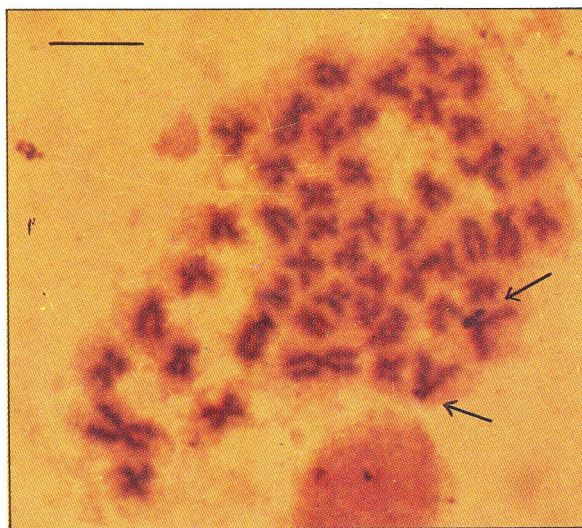


March, controlled breeding was successful when the water temperature was about 28°C. The fertilized eggs were transferred from the mouth of the fishes to trays and incubated. *Ad libitum* administration of 17  $\alpha$  methyl testosterone through diet was made to 7,8,9 and 10 days old hatchlings. Feeds prepared consisted of 5 mg, 10 mg, 20 mg and 30 mg of 17  $\alpha$  methyl testosterone/Kg. The treated fry are being maintained for further study.

## 2.5 CG.6. Cytogenetic Profile of Major Carps, Selected Air Breathing Fishes and some Endangered Species

G. John, W.S. Lakra & A. Barat

Genetic cataloguing using sophisticated cytogenetic techniques yields vital information on our valuable fish genetic resources. The work under this project was envisaged and carried out to identify cytogenetic variation in selected species. (Fig.6)



6. Silver stained Chromosomes of *Labeo rohita* showing Nucleolus Organiser Regions. (bar = 10/ $\mu$ m).

Though NOR could be observed in the earlier experiments, studies continued during the year under report to identify the precise locations of NOR on chromosomes in different species. *Labeo rohita* collected locally revealed NOR patterns in both chromosomes of a submetacentric pair. *Mystus vittatus* revealed NOR in one chromosome of a submetacentric pair. In *Labeo bata*, NOR was localised on the short arm of one submetacentric chromosome pair.

Experiments have shown that in-vivo administration of low doses (0.01%) of Phytohaemagglutinin @ 1ml/100g body wt. in *L. bata* and *M. vittatus* enhanced mitotic index. Bromodeoxyuridine administered in-vivo (0.02mg/g body wt.) enhanced mitotic index in *Catla catla*, *Labeo rohita*, *L. calbasu* and *Cirrhinus mrigala*. The quality of the metaphase plates was also found to have improved.

Field collections of specimens were undertaken in the Srinagar-Garhwal and Haldwani regions of U.P. Metaphase spreads were made from *Schizothorax plagiostomus*, *S. richardsonii*, *Barilius bendelensis*, *Tor putitora* and *Garra gotyla*. Analysis of these are underway to establish the diploid numbers and constructing the karyotypes.

Detailed studies were conducted on the utility of G bands in fish chromosomes. Though G bands could be easily induced, the consistency was erratic. Fish chromosomes being small the banding pattern is generally not reproduced satisfactorily. G banding therefore may not be very useful in identifying all chromosomes individually. Perhaps it can be used in a limited way by



confining it to larger chromosomes.

Studies were conducted on induction of C bands. However the results so far were not very satisfactory. More experiments are under way to evolve a suitable protocol.

The effect of epizootic ulcerative syndrome at the chromosomal level was investigated in *Catla catla*, *Labeo rohita*, *L. calbasu* and *Cirrhinus mrigala*. Metaphases screened did not show any gross chromosomal abnormalities. Changes at the sub-chromosomal level, however, cannot be ruled out. Investigations have been planned for ascertaining such changes, if any.

The studies would lead to genetic characterisation of fishes in addition to helping genetic upgradation.

## 2.6 CM.4 Cryopreservation of Eggs and Embryos of Indian Major Carps

G. John, A.G. Ponniah, W.S. Lakra  
A. Barat, A.K. Singh & A. Gopalakrishnan

Gene banking would essentially involve cryopreservation of eggs and embryos also in addition to milt. However, methods are not available for eggs and embryos. This project is an endeavour to overcome this technical bottleneck and develop a suitable method for our carps. Experiments were undertaken towards realising this goal (Fig.7).

In experiments during the year, major carp embryos (mixed) were tested for their resistance to cryoprotectants. One hour old embryos were exposed to cryoprotectants like sucrose, glucose and DMSO. During exposures embryos were observed to tolerate



7. Indoor breeding facility for carp egg production for cryopreservation experiments.

sucrose. The 10 hours old embryos appeared to tolerate DMSO exposure and not glycerol.

Experiments were conducted on *Cyprinus carpio* var. *communis* embryos using cryoprotectants, DMSO and methanol. During the experiments it was observed that morula survival was partial in some of the treatments of methanol, DMSO and methanol + DMSO. The tail bud stage appeared to withstand all treatments well, indicating a tolerance to the cryoprotectants tested.

In continuation of the above experimentation on *Cyprinus carpio* embryos, methanol was studied elaborately on the tail bud stage. The ranges tested were 2M to 4M methanol. In one set of treatments, embryos were exposed to 2% NaCl for 5-6 minutes before exposure to cryoprotectants. This step appeared to induce mortality in the embryos. From the studies it was obvious that methanol (2M) was the critical limit for survival of embryos at the tail bud stage.



Concentrations higher than this caused mortality.

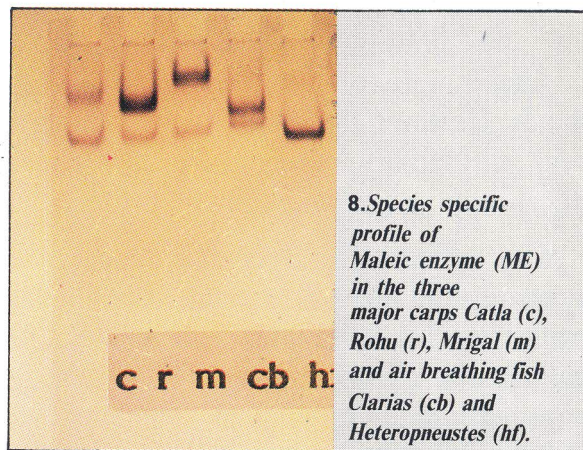
Freezing and thawing of cryoprotected embryos were done using manual methods i.e. with little control over the freezing and thawing rates. Embryos cryopreserved in liquid nitrogen when thawed did not show any survival. Morphograting of these thawed embryos did not reveal gross distortion and the chorion was fairly intact. The damage obviously appears to be at the cellular level either during freezing or thawing. This would be subsequently examined using cryomicroscopy and controlled cooling/thawing facilities. Some embryos kept stored in liquid nitrogen will be thawed in a more controlled manner and examined.

## 2.7 BG.7. Comparative Biochemical Genetic Profile of Major Carps and Other Group of Fishes

A.G. Ponniah, P.K. Sahoo,  
S.K. Srivastava & A. Gopalakrishnan

The objectives of the programme are : (a) to draw up biochemical genetic protocols that can be extended to other fishes and prawns. (b) to identify biochemical genetic markers for delineating genetically distinct strains of fishes and (c) to determine distinct geographic populations belonging to different genetic stocks.

During the period under report, studies were conducted for expanding the range of biochemical genetic systems; differentiating enzyme systems not having distinct substrate specificity; studying the comparative biochemical genetic profile of air breathing



fishes and major carps (Fig.8).

### Systems investigated

By expanding the number of biochemical genetic systems it was possible to increase the number of biochemical genetic markers. These showed species specific patterns and are polymorphic. The 18 enzyme systems screened are as follows.

1. L—Lactate dehydrogenase (LDH)
2. Alcohol dehydrogenase (ADH)
3. L—Iditol dehydrogenase (IDDH)
4. Xanthine dehydrogenase (XDH)
5. Aldehyde dehydrogenase (AHD)
6. Glycerol—3 phosphate dehydrogenase (G3PDH)
7. Glutamate dehydrogenase (GLUDH)
8. Phosphoglucumutase (PGM)
9. Isocitrate dehydrogenase (IDHP)
10. Malate dehydrogenase (MDH)
11. Malic enzyme (MEP)
12. Aspartate amino transferase (AAT)
13. Glucose-6-phosphate dehydrogenase (G6PDH)
14. Phosphogluconate dehydrogenase (PGDH)



15. Fructose-bisphosphate aldolase (FBALD)
16. Glyceraldehyde-3-phosphate dehydrogenase (GAPDH)
17. Superoxide dismutase (SOD)
18. Fructose 1—6 diphosphatase (F16DP)

Besides the above 18 enzyme systems, sodium dodecyl sulphate polyacrylamide (SDS-PAGE) native and SDS-gradient electrophoretic studies were initiated.

Other than PGM, IDHP, MDH, MEP, G6PDH and AAT, standardisation of electrophoretic conditions for the remaining twelve enzyme was carried out during this period. Earlier trials gave an identical pattern for ADH, LDH, XDH and AHD. By altering running conditions it was possible to identify some bands which were specific for each enzyme. The enzymes FBALD and GAPDH also exhibited similar band patterns. By changing staining conditions it was possible to differentiate each enzyme.

### Major carps

Among the enzymes tested SOD and PGDH were found to exhibit species specific patterns in the three major carps. For few other enzymes their species specificity is being confirmed. SDS-PAGE electrophoresis also revealed differences between the species.

On standardisation of the techniques it will be possible to differentiate species, subspecies and stocks etc. genetically which would not only help conservation but also

aquaculture.

### Air-breathing fishes

The biochemical genetic profile of *Heteropneustus fossilis*, *Clarias batrachus*, *Anabas testudineus* and *Channa striatus* were screened using the enzyme systems LDH, AHD, MDH, MEP, AAT G6PDH and PGDH. In all these enzyme systems, species specific patterns were observed. Among the four species, there was greater similarity between *H. fossilis* and *C. batrachus* than the other two species.

### Epizootic Ulcerative Syndrome (EUS)

Studies were carried out to determine whether EUS had affected the phenotypic expression of enzyme systems. In normal, less infected and heavily infected *Cirrhinus mrigala*, nine enzyme systems (LDH, ADH, G3PDH, IDHP, MDH, MEP, AAT, G6PDH, PGDH) were screened. No marked differences could be observed in these enzymes. In SDS-PAGE electrophoresis of serum, the infected fishes exhibited stronger staining of one band.

## 3. COLLABORATION

### 3.1 National

1. Central Inland Capture Fisheries Research Institute, Barrackpore, West Bengal.
2. Central Institute of Brackishwater Aquaculture, Madras, Tamil Nadu.
3. Central Marine Fisheries Research Institute, Cochin, Kerala.

4. National Research Centre on Coldwater Fisheries, Haldwani. — National Marine Fisheries Service, Milford, Conn.
5. Department of Fisheries, Govt. of Uttar Pradesh, Lucknow. — NMFS Woods Hole Laboratory, Woods Hole, MS.
6. Department of Fisheries, Govt. of Himachal Pradesh, Simla. — National Marine Biology Laboratory, Woods Hole, MS
7. Zoological Survey of India, Madras, Tamil Nadu. — Virginia Polytechnique Institute of Fish and Wildlife, Blacksburg, VA
8. Nature Conservators, Muzaffarnagar. — Native Fish Research Centre, U.S. Fish and Wildlife, Gainesville, FL.
9. World Wide Fund for Nature— India, New Delhi. — University of Florida, Dept. of Fisheries, Gainesville, FL.

### 3.2 International

1. Aquaculture Division, United States Agency for International Development, Washington. The collaborative programme includes training of Indian scientists to USA, American experts coming to India on consultancy service and also provision of some equipments to India.
  - Dexter Natural Fish Hatchery for Endangered Species of the US Fish and Wildlife Service, Dexter, NM
  - Washington State University, Zoology Dept, Pullman, WA.
  - University of Idaho, Dept. of Biological Sciences, Moscow, ID.
  - Northwest Fisheries Centre, National Marine Fisheries Service, Seattle, WA.
  - School of Fisheries, University of Washington, Seattle, WA.

Dr. P. Das, Director had undertaken a tour for identifying US Institutions for collaborative work which includes the Genetics and Conservation Laboratories as below :

- US Fish and Wildlife Service, Washington DC
- US Bureau of Land Management, Washington DC
- US Department of Agriculture, Washington DC
- Oceanic Research Programmes, Washington DC

While some Indian Scientists would go to USA for training, one US expert would visit during 1991-92.

## 4. MANPOWER DEVELOPMENT

### 4.1 Scientific and Technical

The following personnel had undertaken study tour/undergone training in their respective fields :

- Dr. George John, Scientist (Sel. Grade)



attended the Course on Agricultural Research Project Management at the National Academy for Agricultural Research Management (NAARM), Rajendranagar, Hyderabad from July 17 to 28, 1990.

- Mrs. S. Das, Librarian (Technical Officer), Dr. A. Barat (Technical, T-4) and Dr. (Mrs.) P.K. Sahoo (Technical, T-4) were deputed to NAARM, Hyderabad from 31 July to Aug. 10, 1990 to attend a programme on Technical Information Management, Research Communication and Project Maintenance in Agriculture.
- Dr. A.G. Ponniah, Scientist (Sel. Grade) attended the Human Resource Management Training at NAARM, Hyderabad from 20th August to September 1, 1990.
- Shri P. Chithamparam, Lib. Assistant (T-II-3) underwent a training on Computer application for Library & Information Activities conducted by Indian National Scientific Documentation Centre (INSDOC), New Delhi from 4th March to 29th March 1991.

#### **4.2 Honours and Awards**

- Dr. P. Das, Director was elected as the Fellow of the National Academy of Sciences, India, Allahabad.
- Dr. P. Das, Director was elected as the member of the Editorial Board, Indian Journal of Fisheries, Publication & Information Division, ICAR, New Delhi.
- Dr. George John, Scientist (Sel. Grade) was

elected as a Councillor of the Inland Fisheries Society of India, Barrackpore.

## **5. TRANSFER OF TECHNOLOGY**

### **5.1 Advisory Services**

Fish farmers as well as others interested in fisheries visited the Bureau frequently for getting technical know how on aquacultural aspects. Necessary advice on various aspects of both fin and shell fish culture were rendered. Technical advice was also offered to interested persons during the visit of the scientists to villages. The broad aspects included polyculture, induced breeding avoiding genetic constriction, prophylactic measures for fish diseases, renovation of old ponds and construction of fish farm for pisciculture.

### **5.2 Field Demonstrations on Scientific carp culture**

Under the effort of transfer of ICAR technologies to the field, modern technology of carp culture was demonstrated in two ponds at Fatehpur in U.P. In addition to time to time method demonstrations, the one year crop was shown to the local farmers in an organized Field Demonstration where Chief Development Officer, Chief Executive Officer of the FFDA, Block Development Officer, Gram Pradhan, Block Pramukh etc. also participated. The net production of the two ponds were recorded as follows.

Pond No. I of 0.34 ha. — 7187.6 Kg/ha/yr  
Pond No. II of 0.66 ha. — 7995.2 Kg/ha/yr

The whole technique of fish culture was highlighted emphasizing the need of maintaining species composition in relation to water depth in different ponds, pre and post stocking management measures. It was a thrilling experience of seeing a huge crop for the participating farmers and others.

### 5.3 Other activities

#### 5.3.1. Epizootic Ulcerative Syndrome (EUS)



9. *Cirrhinus mrigala*, affected by Epizootic Ulcerative Syndrome disease

Studies were undertaken on prophylactic and curative aspects of the Epizootic Ulcerative Syndrome Disease spread in the District of Allahabad. 16 ponds sponsored by Fish Farmer's Development Agency at Allahabad were known to be infected with EUSD during the period of studies (Fig.9). Mortality of fishes was also reported in some of the ponds.

Suggestions for prophylactic measures offered to the farmers included daily supplementary feeding @ 2-3% body weight

of fishes with nutritive items and application of 4 doses of fortnightly liming @150 Kg/ha. Most of the farmers adopting such measures did not find the disease.

The curative measures suggested were 2 doses of sodium chloride @ 75 Kg/ha on monthly interval in 3 ponds and potassium permanganate @ 1 ppm on every third day for 2 weeks in 2 ponds. The spread of the disease was observed to be arrested in a month and gradually got cured in about 3 months.

#### 5.3.2 World Environment Day

World Environment Day was organised on 5th June, 1990, where Scientists and Technicians participated and delivered lectures on the significance of the day.

## 6. LIBRARY AND DOCUMENTATION SERVICE

### 6.1 Library Holdings

The Library acquired 170 of the latest books, 96 reprints and 26 photocopies of scientific papers, 60 miscellaneous publications and subscribed to 27 Foreign and 28 Indian journals. In addition, the library acquired 31 Foreign and 30 Indian journals in exchange or as gratis. The library, in March 1991, had a total holding of 859 books, 102 reprints, 159 photocopies, 321 miscellaneous publications and 58 maps. The total expenditure incurred by the library during the year was Rs.3,58,979.00.

### 6.2 Exchange Services

The library maintained exchange



relationship with 60 leading National and International Research Institutes/Information Centres.

The library continued free mailing of the Bureau's Annual Report and other publications to research organisations, universities, agencies, entrepreneurs and fish farmers. It also extended its services to the scientific personnel of research organisations, university research scholars, students and individuals through inter-library loan services and reading room facilities.

### 6.3 Reprography Services

The section maintained active reprography services by producing departmental publications and supplying photocopies to the scientists of the Bureau as well as to other research institutes and universities free of cost.

The section also provided cyclostyling and comb binding facilities for departmental publications.

### 6.4 Technical Reports

Twenty one technical reports on the progress of research activities and administrative activities of the Bureau were compiled and sent to various required places. Thirty-three review and research papers of the scientists were communicated to various journals and symposia/seminars/conferences for presentation and publication.

Twenty three technical queries regarding the activities of the Bureau from various quarters of the country and abroad were attended to by the section.

### 6.5 Information Services

The section geared up the information services by procuring publications from International Union for Conservation of Nature and Natural Resources, Gland, Switzerland on resource conservation for catering information to the scientists. It also took Institutional Membership of IUCN Bulletin for information retrieval.

Contents list (quarterly) were provided to the scientists to keep them abreast of the latest references.

The book entitled Recent trends in Limnology, Edited by V.P. Agrawal and P. Das was published by the Society of Biosciences, Muzaffarnagar, U.P. in 1990. The book contains 48 articles on marine system, lakes, rivers, specially Ganga river and high attitude limnology. The book will provide very useful information for fisheries scientists and planners.

### 6.6 General Publications

The following publications were brought out by the Bureau during the year.

- Annual Report 1989-90
- Status report on natural genetic resources of fish and their conservation— P. Das & D. Kapoor.
- Status report on conservation of fish diversity in India—P. Das, A.G. Ponniah & D. Kapoor.
- Base paper submitted for the First Meeting of the Management Committee of NBFGR, 20 Nov., 1990.
- Brochure on National Bureau of Fish Genetic Resources, March 1991.

## 7. CONFERENCES AND SYMPOSIA

### 7.1 Participation

**The Scientists and Technicians of the Bureau participated in various Conferences/Symposia/Meetings**

Sl. No.	Conferences/Symposia/Seminar	Organised by	Title of the paper presented with Authorship	Name of the Participants
1.	The Second Indian Fisheries Forum, 27-31 May, 1990.	Asian Fisheries Society, Indian Branch held at College of Fisheries, Univ. of Agril. Sci., Mangalore.	Some observations on productivity of freshwater fish ponds-(Abstracts) —P. Das <i>et. al.</i>	—
2.	—do—	—do—	Olfaction in selected coldwater fishes. (Abstract)- W.S. Lakra.	—
3.	—do—	—do—	Comparative biochemical genetic profile of Indian major carps. (Abstract)— A.G. Ponniah & P.K. Sahoo.	—
4.	Asian Regional Workshop on Tilapia Genetics, 29-31 Aug., 1990.	International Centre for Living Aquatic Resource Management, Makati, Metro Manila, held at Freshwater Aquaculture Centre, Munoz, NE. Philippines.	Heritability studies and predicted response to selection for genetic gain in growth of <i>Oreochromis spilurus</i> -P. Das.	Dr. P. Das



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|--|--|--|-------------------------------|
| 5. National Symposium on Sustainable Management of Natural Resources, 14-15 Sept. 1990.              | National Academy of Sciences, India, Allahabad held at University of Pondicherry, Pondicherry. | Conservation of fish genetic diversities in India—P. Das & W.S. Lakra.   | Dr. P. Das                    |
| 6. National Seminar on Aquaculture Development in India—Problems and prospects, 27-29 November 1990. | Department of Aquatic Biology & Fisheries, University of Kerala, Thiruvananthapuram, Kerala.   | Aquaculture stock improvement through genetic manipulation—P. Das.   | Presented by Dr. A.G. Ponniah |
| 7. —do—  | —do—   | Biotechnological inputs for enhancing Indian aquaculture production— A.G. Ponniah  | Dr. A.G. Ponniah              |
| 8. —do—  | —do—   | Relevance of genetics in aquaculture—George John   | Dr. George John               |
| 9. National Symposium on Frontiers in Modern Biology, 1-3 Dec. 1990.                                 | Department of Biosciences, Jamia Millia Islamia, New Delhi.                                    | Fish genetic resources conservation in India— P.Das  | Dr. P.Das & Dr. W.S. Lakra    |
| 10. Seventh All India Congress of Cytology and Genetics, 22-26 December, 1990.                       | Department of Zoology, University of Kalyani, Kalyani, W.B.                                    | Biochemical genetics of NAD-dependent dehydrogenase enzyme systems in Indian major carps—use of inhibitors—A.G. Ponniah & P.K. Sahoo | Presented by Dr. A. Barat     |

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|--|---|--|----------------------------|
| 11. Seventh All India Congress of Cytology and Genetics, 22-26 December, 1990.   | Department of Zoology, University of Kalyani, Kalyani, W.B.                               | Comparative studies on Karyotypes and location of nucleolus organiser regions in the Indian major carps—<br>W.S. Lakra <i>et al.</i> | Presented by Dr. A. Barat  |
| 12. Seventh All India Congress of Cytology and Genetics, 22-26 Dec., 1990.   | Department of Zoology, University of Kalyani, Kalyani, W.B.                               | Preliminary investigation on G-banding and NOR in some Indian teleosts—<br>A. Barat <i>et. al</i>                                    | Dr. A. Barat               |
| 13. Golden Jubilee Symposium on Genetic Research & Education: Current Trends and the next Fifty Years 12-15 Feb. 1991. | Indian Agricultural Research Institute, Pusa, New Delhi— held at Ashoka Hotel, New Delhi. | Biological diversity of fishes and their conservation—<br>P. Das   | Dr. P. Das & Dr. D. Kapoor |
| 14. SAARC Countries Conference : Environment Management in Developing Countries, 23-24 February 1991.                  | Feroze Gandhi College, Rae-Bareli, U.P.   | Fish germplasm resource conservation in India— P. Das.   | Dr. P. Das                 |





10. Director, Dr. P. Das discussing with members of the QRT (R to L, Prof. A.S. Mukherjee, Prof. G.K. Manna, Dr. K.K. Rishi, Prof. K.K. Chatterjee).

## 7.2 Important Meetings

The following meetings were organised by the Bureau during April, 1990 to March, 1991.

- Quinquennial Review Team meeting was held on 16-17 April, 1990 to review the achievements and work of this Bureau under the Chairmanship of Prof. A.S. Mukherjee. The other members who attended the meeting were Prof. G.K. Manna, Prof. K. Chatterjee, Dr. K.K. Rishi. (Fig.10)
- 2nd meeting of the Quinquennial Review Team was held from 2-4 May 1990 to review the progress of this Bureau during the period 1983-1988. Fig. 11
- Meeting of the NBFGR site Selection Committee was held during 25-26 June 1990, followed by field visits.



11. Prof. A.S. Mukherjee, Chairman QRT studying gels of isozymes at the Biochemical Genetic Laboratory.





12. Dr. P.V. Dehadrai, DDG (Fy.), Shri K.D. Pandey, Director U.P. Fisheries and Dr. P. Das, Director NBFGR, inspecting a site for the Bureau.

- Staff Research Council Meeting was held on October 1990 and discussion made on on-going research projects and on new projects.
- Another meeting for Land Selection

headed by Dr. P.V. Dehadrai, DDG (Fy) was held on 16-17 Nov. 1990. (Fig.12)

- The Management Committee for NBFGR was formed and its first meeting was held on 20 Nov. 1990. Fig. 13



13. Meeting of the Bureau's Management Committee in progress.





14. *The Director discussing with Rotarians from Brazil and India.*

## 8. VISITORS

A good number of distinguished personalities visited the Bureau during 1990-91  
Fig. 14

Acharya, R.M. (Dr.),	Deputy Director General (AS), ICAR, New Delhi.
Agrawal, V.P. (Dr.),	Ex-Principal, D.A.V. College and Prof. of Zoology, President of Society of Biosciences, Muzaffarnagar, U.P.
Chatterjee, K. (Prof.),	Deptt. of Zoology, North Eastern Hill University, Shillong.
Dehadrai, P.V. (Dr.),	Deputy Director General (FY.), ICAR, New Delhi.
De Silva, N.J. (Dr., Mrs.),	Deptt. of Zoology/Fish Biology, University of Ruhuna, Matara, Srilanka.
Horne, Michael D. (Mr.),	Rua Baronesa Je, Rio De Janeiro, RJ, Brazil.
Macider, Marcos de (Mr.),	Rua Conde le Bonjim, Rio De Janeiro, Brazil.

Manna, G.K. (Prof.),	Deptt. of Zoology, University of Kalyani, Kalyani, West Bengal.
Menon, M.G. (Shri),	Under Secretary, Department of Agricultural Research & Education, New Delhi.
Mukherjee, A.S. (Prof.),	Deptt. of Zoology, University of Calcutta, Calcutta.
Pandey, K.D. (Shri),	Director of Fisheries, U.P. Lucknow.
Rishi, K.K. (Dr.),	Deptt. of Zoology, Kurukshetra University, Kurukshetra.
Saxena, M.C. (Dr.)	Executive Director, Environmental Research Laboratory, Lucknow.
Singh, Mandhata (Shri),	Hon'ble Member of Parliament & Chairman, Parliamentary Committee, Lucknow.
Srivastava, C.B.L. (Prof.),	Head, Deptt. of Zoology, University of Allahabad, Allahabad.
Srivastava, U.S. (Prof.),	Vice President, National Academy of Sciences, India, Allahabad.
Swarup, Krishna (Prof.),	Emeritus Scientist, National Academy of Sciences, India, Allahabad.



## 9. SCIENTIFIC PUBLICATIONS

Barat, A. & P.K. Sahoo (1990).

Fish immunology—an overview. (*In Recent Trends in Limnology*, by V.P. Agrawal & P. Das, Muzaffarnagar, Society of Biosciences, 1990, pp. 401-405)

Barat, A., John, G. and Lakra, W.S. (1990)

Preliminary investigation on G-banding and NOR in some Indian teleosts (Abstract). (*In Seventh All India Congress of Cytology and Genetics: Programme & Abstracts*, hosted by Deptt. of Zoology, University of Kalyani, Kalyani, W. Bengal., Dec. 22-26, 1990, p.67.)

Bhaumik, U., Banerjee, B.K. & Das, P. (1989)

Raising carp seed alongwith paddy (*J. Inland Fish. Soc. India*, 21(2) : 49-51)

Das, P. (1990)

An approach to fish genetic resource conservation in India. (*In Souvenir : a special issue of AFSIB Newsletter*, 4(1), April-Sept., 1990., pp. 6-8)

Das, P. (1990)

Application of genetics in aquaculture. (*In Impacts of Environment of Animals and Aquaculture*, eds. by G.K. Manna & B.B. Jana, Kalyani University, Kalyani, 1990 : 63-66).

Das, P. (1990)

Aquaculture stock improvement through genetic manipulations. (*In National Seminar on Aquaculture Development in India : Problems & Prospects*, 27-29, Nov. 1990, Thiruvananthapuram, Abstracts, pp.75-76).

Das, P. (1990)

Conservation of fish germplasm resources of India. (*In Charter for Nature : Basic material for school teachers to prepare outdoor exercises in India*, ed. by S.N. Dwivedi & V.S. Bhatt, New Delhi, Department of Ocean Development, Govt. of India & Indian Council of Agricultural Research, April 1990, pp. 107-125).

Das, P. (1990)

Fish genetic resource conservation in India. (Abstract). (*In National Symposium on Frontiers in Modern Biology*, Org. by Deptt. of Biosciences, Jamia Millia Islamia, New Delhi, held on 1-3 Dec., 1990).

Das, P. (1991)

Biological diversity of fishes and their conservation. (*In Golden Jubilee Symposium on Genetic Research & Education : Current Trends and the Next*

Fifty Years, Feb. 12-15, 1991, New Delhi, Abstracts, Vol. 3:834-835).

Das, P. (1991)

Fish germplasm resource conservation in India. (Abstract). (*In SAARC Countries Conference on Environment Management in Developing Countries, February 23-24, 1991. Abstracts, held at Feroze Gandhi College, Rae-Bareilly, India, pp. 44-45).*

Das. P. (1991)

Genetics in enhancing aquaculture productivity. (*In Aquaculture Productivity : Proc. of Symposium on Aquaculture Productivity held in Dec. 1988 under aegis of Hindustan Lever Research Foundation, ed. by V.R.P. Sinha & H.C. Srivastava, New Delhi, Oxford & IBH Pub. Co. Pvt. Ltd., 1991 : 623-627).*

Das, P. & Barat, A. (1990)

Fish habitat degradation necessitating conservation. (*In Environmental Concern and Tissue Injury, Part-I, ed. by R. Prakash & S.M. Choubey, Muzaffarnagar, Soc. for Sci. & Environment, pp. 85-89).*

Das, P. & G. John (1990)

Fish genetics research in India. (*In Recent Trends in Limnology, by V.P. Agrawal & P. Das, Muzaffarnagar, Society of Biosciences, 1990, pp. 481-490).*

Das, P., G. John & W.S. Lakra (1990)

Exotic fish germplasm in Indian reservoirs. (*In Reservoir Fisheries in India : Proceedings of the National Workshop on Reservoir Fisheries, 3-4 January, 1990. Mangalore, Asian Fisheries Society, Indian Branch, Special Publication 3 : 45-47)*

Das, P., S.K. Mondal, U.Bhaumik, P.K. Pandit, B.K. Banerjee & B. Roy (1990)

Some observations on productivity of freshwater fish ponds (Abstracts). (*In Abstracts : The Second Indian Fisheries Forum, May 27-31, 1990, Mangalore, Karnataka, p. 286).*

Das, P., W.S. Lakra & George John (1990)

Conservation genetics of endangered fish populations. (*In Recent Trends in Limnology, by V.P. Agrawal & P. Das, Muzaffarnagar, Soc. of Biosciences, 1990; pp. 99-103).*

James, P.S.B.R. & A.G. Ponniah (1991)

Concepts in marine biotechnology and their applications for enhancing aquaculture productivity. (*In Aquaculture Productivity, ed. by V.R.P. Sinha and H.C. Srivastava, New Delhi, Oxford & IBH Pub. Co. Pvt. Ltd., 1991 : 599-605)*



John, G. (1990)

Relevance of genetics in aquaculture. (*In National Seminar on Aquaculture Development in India: Problems & Prospects, 27-29 Nov., 1990, Thiruvananthapuram, Abstracts, p. 79*).

Lakra, W.S. (1990)

Induced breeding of carps in relation to the limnology of ponds. (*In Recent Trends in Limnology, by V.P. Agrawal & P. Das, Muzaffarnagar, Soc. of Biosciences, 1990, pp. 135-143*).

Lakra, W.S. (1990)

Olfaction in selected coldwater fishes. (Abstract). (*In Abstracts: The Second Indian Fisheries Forum, May 27-31, 1990, Mangalore, Karnataka, Pub. by Asian Fish. Society, Indian Branch, p. 135*).

Lakra, W.S., A. Barat, L.B. Singh & G. John (1990)

Comparative studies on karyotypes and location of nucleolus organizer regions in the Indian major carps. (Abstract). (*In Seventh All India Congress of Cytology and Genetics: Programme & Abstracts, hosted by Deptt. of Zoology, University of Kalyani, W. Bengal, Dec. 22-26, 1990, p. 67*).

Lakra, Wazir Singh & K.K. Rishi (1991)

Chromosomes of Indian fishes: an annotated list. (*Indian J. Anim. Sc., 61(3): 342-349*).

Ponniah, A.G. (1990)

Biotechnological inputs for enhancing Indian aquaculture production. (*In National Seminar on Aquaculture Dev. in India: Problems & Prospects, 27-29, Nov. 1990, Thiruvananthapuram, Abstracts, p. 75-76*).

Ponniah, A.G. & P.K. Sahoo (1990)

Biochemical genetics of NAD dependent dehydrogenase enzyme systems in Indian major carps-use of inhibitors. (Abstract). (*In Seventh All India Congress of Cytology and Genetics: Programme & Abstracts, hosted by Deptt. of Zoology, University of Kalyani, Kalyani, W. Bengal, Dec. 22-26, 1990, pp. 66-67*).

Ponniah, A.G. & P.K. Sahoo (1990)

Comparative biochemical genetic profile of Indian major carps. (Abstracts). (*In Abstracts: The Second Indian Fisheries Forum, May 27-31, 1990, Mangalore, Karnataka, Pub. by Asian Fisheries Society, Indian Branch, p. 107*).

Singh, A.K. (1990)

A review on limnological status of some lakes in Uttar Pradesh. (*In Recent Trends in Limnology, by V.P. Agrawal & P. Das, Muzaffarnagar, Society of Biosciences, 1990, pp. 275-280*).

## 10. PERSONNEL

### 10.1 List of Personnel

#### Dr. P. Das—Director

##### Scientific

- |                          |   |
|--------------------------|---|
| 1. Dr. L.B. Singh        | — Principal Scientist                                     |
| 2. Dr. M. Sinha          | — Principal Scientist<br>(on deputation to NEC, Shillong) |
| 3. Dr. A.G. Ponniah      | — Scientist (Sel. Grade)                                  |
| 4. Dr. George John       | — Scientist (Sel. Grade)                                  |
| 5. Dr. D. Kapoor         | — Scientist (Sel. Grade)                                  |
| 6. Sri P.C. Mahanta      | — Scientist (Sr. Scale)                                   |
| 7. Dr. W.S. Lakra        | — Scientist (Sr. Scale)                                   |
| 8. Sri. S.P. Singh       | — Scientist   |
| 9. Sri A. Gopalakrishnan | — Scientist   |

##### Technical

- |                               |   |
|-------------------------------|---|
| 1. Dr. A.K. Singh             | — Asstt. Farm Manager, T-6                                    |
| 2. Smt. Sukla Das             | — Librarian, T-5  |
| 3. Sri A.K. Mishra            | — Electrical Foreman, T-4                                     |
| 4. Dr. A. Barat               | — Senior Laboratory Technician<br>(Cytogenetics), T-4         |
| 5. Sri Babu Ram               | — Farm Engineering Asstt., T-4                                |
| 6. Dr. (Mrs.) P.K. Sahoo      | — Senior Laboratory Technician<br>(Biochemical Genetics), T-4 |
| 7. Sri Rajesh Dayal           | — Field Surveyor, T-4   |
| 8. Sri S.M. Srivastava        | — Field Surveyor, T-4   |
| 9. Sri Rabinder Singh Patiyal | — Farm Asstt., T-4  |
| 10. Dr. K.D. Joshi            | — Senior Laboratory Technician<br>(Fish Biology), T-4         |
| 11. Sri P. Chithamparam       | — Library Assistant, T-II-3                                   |
| 12. Sri A.K. Singh            | — Jr. Survey Asstt., T-2                                      |
| 13. Sri S.K. Paul             | — Jr. Survey Asstt., T-2                                      |
| 14. Sri B.K. Rao              | — Sample Sorter, T-1  |
| 15. Sri Raj Kumar Sukla       | — Sample Sorter, T-1  |
| 16. Sri Bhola Nath Pathak     | — Gestener Operator, T-1                                      |



17. Sri Ved Prakash
18. Sri Rama Shankar Sah

- Library Attendant, T-1
- Dark Room Assistant, T-1

### **Administrative**

1. Sri R.C. Srivastava
2. Sri A. Sah
3. Sri R.C.P. Sinha
4. Sri K.P. Nath
5. Sri A.K. Srivastava

- Asstt. Finance & Accounts Officer
- Superintendent
- Stenographer
- Assistant
- Senior Clerk  
(On deputation to TOT Project,  
Kanpur)
- Senior Clerk
- Junior Clerk
- Junior Clerk
- Junior Clerk

6. Sri Panchoo Lal
7. Sri Mohan Tiwari
8. Smt. Chanda Tiwari
9. Sri Navin Kumar

### **Auxiliary**

1. Sri Samarjit Singh
2. Sri Om Prakash

- Driver
- Driver

### **Supporting**

1. Sri Sree Ram
2. Sri Madan Lal
3. Sri Raj Bahadur
4. Sri Swapan Debnath
5. Sri K.K. Singh
6. Sri Ram Baran
7. Sri Laxhman Prasad
8. Sri Dukhi Shyam Deo
9. Sri Inderjit Singh
10. Sri Anil Kumar
11. Sri Prahlad Kumar

- Fieldman, SSG-III
- Fisherman, SSG-I
- Laboratory Attendant, SSG-I
- Laboratory Attendant, SSG-I
- Fieldman, SSG-I
- Fisherman, SSG-I
- Fisherman, SSG-I
- Fisherman, SSG-I
- Messenger, SSG-I
- Safaiwala, SSG-I
- Safaiwala, SSG-I

## 10.2 Appointments

Sl.No.	Name	Designation	Date of appointment
<b>Scientific</b>			
1.	Sri A. Gopalakrishnan	Scientist	21.9.1990
<b>Technical</b>			
1.	Dr. K.D. Joshi	Sr. Laboratory Technician (Fish Biology), T-4	15.6.1990
2.	Sri A.K. Singh	Jr. Survey Assistant, T-2	26.9.1990
3.	Sri S.K. Paul	Jr. Survey Assistant, T-2	16.10.1990
<b>Auxiliary</b>			
1.	Sri Om Prakash	Driver	12.7.1990
<b>Supporting</b>			
1.	Sri Prahlad Kumar	Safaiwala, SSG-I	27.10.1990

## 10.3 Transfer/Deputation

Sl.No.	Name	Posts	Date of joining	Date of relieving	Transferred	
					from	to
1.	Sri A.K. Srivastava	Sr. Clerk		24.11.90	NBFGR Allaha- bad	Zonal Coordinat- ing Unit, Kanpur



## 11. MANAGEMENT COMMITTEE

The Bureau's Management Committee, as below, was constituted by the ICAR during the year under report.

- |   |          |
|---|----------|
| 1. The Director,<br>NBFGR, Allahabad  | Chairman |
| 2. The Assistant Director General (Inland<br>Fisheries), ICAR, New Delhi  | Member   |
| 3. Director of Fisheries,<br>Govt. of U.P., Lucknow.  | Member   |
| 4. Dr. C.S. Singh,<br>Prof. & Head, College of Fisheries,<br>G.B. Pant University of Agriculture<br>& Technology, Pantnagar, U.P. | Member   |
| 5. Shri P.C. Chakraborty,<br>Jt. Director of Fisheries,<br>Govt. of West Bengal, Calcutta   | Member   |
| 6. Shri Mohammad Akil,<br>Secretary,<br>Matsya-Jiwi Sehkari Samiti Ltd.,<br>Allahabad, U.P.                                       | Member   |
| 7. Shri Narendra Kr. Nishad,<br>Lawyer,<br>Representative<br>National Association of Fisherman,<br>Allahabad, U.P.                | Member   |
| 8. Dr. L.B. Singh,<br>Principal Scientist,<br>NBFGR, Allahabad.   | Member   |
| 9. Dr. A.G. Ponniah,<br>Scientist (Sl. Grade),<br>NBFGR, Allahabad  | Member   |
| 10. Dr. G. John,<br>Scientist (Sl. Grade),<br>NBFGR, Allahabad.   | Member   |

- |    |  |                      |
|----|--|----------------------|
| 11 | Dr. W.S. Lakra,<br>Scientist (Sr. Scale),<br>NBFGR, Allahabad. | Member               |
| 12 | A.F. & A.O.,<br>NBFGR, Allahabad                               | Member               |
| 13 | Superintendent,<br>NBFGR, Allahabad                            | Member-<br>Secretary |

The Management Committee started functioning with its first meeting at Allahabad on 20.11.90.



## 12. STAFF WELFARE ACTIVITIES

### 12.1 Institute Joint Staff Council

The Institute Joint Staff Council also was constituted as below to consider matters of common interest concerning the staff of the Bureau and to recommend suitable remedial measures. The first meeting of the IJSC was held on 20.7.90.

#### Official Side

1. Dr. P. Das, Director	Chairman
2. Dr. L.B. Singh, Principal Scientist	Member
3. Dr. D. Kapoor, Scientist (Sl.Gr.)	Member
4. Sri P.C. Mahanta, Scientist (Sr. Scale)	Member
5. Dr. W.S. Lakra, Scientist (Sr. Scale)	Member
6. Sri R.C. Srivastava, A.F. & A.O.	Member
7. Sri A. Sah, Superintendent	Secretary

#### Staff Side

1. Sri A.K. Mishra, T-4	Secretary
2. Sri Ved Prakash, T-I	Member
3. Sri K.P. Nath, Assistant	Member
4. Sri P. Lal, Sr. Clerk	Member
5. Sri Ram Baran, Fisherman	Member
6. Sri K.K. Singh, Fieldman.	Member

### 12.2 Grievance Cell

The Bureau's Grievance Cell was also constituted during the year to look into the Staff's grievances concerning official matters. The name of the members of the Grievance Cell are given below :

#### Nominees of the Director

1. Dr. L.B. Singh, Principal Scientist	Chairman
2. Dr. A.G. Ponniah, Scientist (S.G.)	Member

3. Sri R.C. Srivastava, A.F. & A.O.
4. Sri A. Sah, Superintendent

Member  
Member-  
Secretary

**Elected staff representatives**

1. Sri S.P. Singh, Scientist
2. Sri A.K. Mishra, T-4
3. Sri K.P. Nath, Assistant
4. Sri Madan Lal, Fisherman

Scientific  
Technical  
Administrative  
Supporting



## 13. रिपोर्ट का हिन्दी सारांश

### 13.1 भूमिका

#### 13.1.1 संक्षिप्त इतिहास

हमारे देश के अन्तर्स्थलीय एवं समुद्री मत्स्य विकास सम्बन्धी राष्ट्रीय कार्यक्रमों के अन्तर्गत यह सुनिश्चित किया गया है कि मछली उत्पादन में केवल वृद्धि ही पर्याप्त नहीं है अपितु प्रकृति प्रदत्त विभिन्न मत्स्य प्रजातियों एवं उनमें पायी जाने वाली विभिन्नता का संरक्षण भी अत्यन्त आवश्यक है। भारत सरकार द्वारा इसके महत्व को ध्यान में रखते हुए कुछ समय पूर्व राष्ट्रीय मत्स्य आनुवंशिक संसाधन ब्यूरो की स्थापना का अनुमोदन किया गया। भारतीय कृषि अनुसंधान परिषद के अन्तर्गत ब्यूरो ने पिछले कुछ वर्षों से अपना कार्य भी आरम्भ कर दिया है।

#### 13.1.2 उद्देश्य :

- राष्ट्र के समस्त मत्स्य आनुवंशिक संसाधनों के विषय में समग्र सूचनाओं तथा ज्ञान का एकत्रीकरण एवं वर्गीकरण (कैटलागिंग)
- मत्स्य आनुवंशिक संसाधनों का संरक्षण
- भारतीय जल संसाधनों के लिए उपयुक्त विदेशी मत्स्य प्रजातियों का चयन एवं अनुमोदन
- लुप्तप्राय (एन्डैन्जर्ड) प्रजातियों का संरक्षण

#### 13.1.3 संगठन :

ब्यूरो का मुख्यालय इस समय इलाहाबाद में स्थित है। कार्य के सुचारु रूप से क्रियान्वयन हेतु ब्यूरो के संगठनात्मक ढांचे में निम्नलिखित चार केन्द्रों का प्रस्ताव है।

- (1) मृदु जलीय संसाधन केन्द्र
- (2) शीत जलीय संसाधन केन्द्र
- (3) क्षार जलीय संसाधन केन्द्र
- (4) समुद्र जलीय संसाधन केन्द्र

उपरोक्त चारों केन्द्रों पर सम्बन्धित मत्स्य प्रजातियों के संरक्षण एवं शोध कार्य होंगे। इसके अतिरिक्त मुख्यालय पर स्थित निम्न चार सम्भाग (सेक्शन) संरक्षण एवं शोध क्षेत्र में कार्यरत हैं।

- (1) कोशिकानुवंशिकी
- (2) जीव रसायन आनुवंशिकी
- (3) जीव विज्ञान
- (4) संरक्षण एवं प्रबन्ध

#### 13.1.4 वैज्ञानिक स्थिति :

इस अवधि में ब्यूरो के सभी सम्भागों में सक्रिय रूप से कार्यरत वैज्ञानिकों की कुल संख्या केवल आठ थी।

## 13.2 प्रमुख उपलब्धियां :

### 13.2.1 मछलियों में शुक्राणुओं का हिम परिरक्षण :

मछलियों का जीन बैंक स्थापित करने के उद्देश्य से व्यावसायिक रूप से महत्वपूर्ण मछलियां रोहू, कतला, नैन, कामन कार्प एवं लुप्तप्राय (एन्डैन्जर्ड) प्रजाति जैसे टोर खुदरी के शुक्राणुओं (मिल्ट) के हिम परिरक्षण सम्बन्धी प्रयोग किये गये। विभिन्न प्रयोगों में सोडियम क्लोराइड साइट्रेट अग्रसारक (एक्सटेन्डर) सबसे उपयुक्त पाया गया। प्रयोगों से सम्बन्धित विवरण निम्नलिखित हैं।

#### भारतीय मुख्य कार्प :

रोहू के हिम परिरक्षित शुक्राणु जिन्हें अगस्त 1989 में संग्रह किया गया था उनमें 60 से 80 प्रतिशत तक सक्रिय पाये गये। जुलाई 1990 में इन शुक्राणुओं से मत्स्य निगम के अमेठी स्थित फार्म में प्रजनन सम्बन्धी प्रयोग किये गये। परिणामस्वरूप 13.7 प्रतिशत दर से अण्डोद्गमन (हैचिंग) प्राप्त करने में सफलता मिली जबकि सामान्य (कन्ट्रोल) शुक्राणुओं से अण्डोद्गमन दर 30.9 प्रतिशत पायी गयी।

#### महाशीर :

महाराष्ट्र स्थित लोनावला मत्स्य फार्म से एकत्रित किये गये टोर खुदरी के शुक्राणुओं को विभिन्न उपचारकों के साथ मिलाकर द्रव नाइट्रोजन में रखा गया। टोर खुदरी एवं टोर शंकर प्रजाति (हाइब्रिड) के शुक्राणुओं को भी हिम परिरक्षित किया गया। जिसमें 60-80 प्रतिशत शुक्राणु सक्रिय पाये गये।

#### कामन कार्प :

मार्च 1990 में संग्रह किये गये कामन कार्प के हिम परिरक्षित शुक्राणु 12 महीने बाद लगभग 50 प्रतिशत सक्रिय पाये गये। इन शुक्राणुओं से ब्यूरो की प्रयोगशाला में प्रजनन सम्बन्धी प्रयोगों में अण्डोद्गमन (हैचिंग) दर 0.66 से 1.1 प्रतिशत पायी गयी जबकि सामान्य (कन्ट्रोल) शुक्राणुओं से अण्डोद्गमन दर केवल 32.4 प्रतिशत रही।

### 13.2.2 भारत के मत्स्य आनुवंशिक संसाधनों का कैंटलाग तैयार करना :

इस अध्ययन का मुख्य उद्देश्य भारतवर्ष के समस्त मत्स्य आनुवंशिक संसाधनों सम्बन्धी सूचना एवं ज्ञान को एकत्र करके कैंटलाग तैयार करना है। इन अध्ययनों के अन्तर्गत गंगा नदी के मृदु जलीय स्रोतों में आर्थिक महत्व वाली प्रजातियों की परिलब्धता एवं उनकी संगठनात्मक संरचना का ज्ञान प्राप्त करना तथा उनके आधार पर लुप्तप्राय (एन्डैन्जर्ड), लुप्तोन्मुख (थ्रेटेन्ड) एवं दुर्लभ (रेयर) मत्स्य जनक तत्वों को सूचीबद्ध करना सम्मिलित है।

अब तक प्राप्त आंकड़ों एवं जानकारी के आधार पर मछलियों की 1483 प्रजातियों को सूचीबद्ध किया जा चुका है जिसमें शीत जल, मृदु जल, क्षारीय जल और समुद्री जल स्रोतों की क्रमशः 4.53 प्रतिशत, 30.34 प्रतिशत, 9.37 प्रतिशत और 55.76 प्रतिशत मत्स्य प्रजातियां सम्मिलित हैं।



इस अवधि में 89 आर्थिक महत्व की मत्स्य प्रजातियों के विषय में वर्गीकरण, पहचान, वितरण, बायोनामिक्स, जीवन-चक्र, मत्स्य उद्योग, मत्स्य पालन, आनुवंशिकी एवं संरक्षण स्तर इत्यादि सम्बन्धी विभिन्न पहलुओं पर अब तक प्रकाशित प्रकाशनों से विभिन्न विस्तृत जानकारियों को एकत्र किया गया। इन सूचनाओं को ब्यूरो द्वारा तैयार किये गये प्रारूप (प्रोफार्मा) के आधार पर कम्प्यूटर की मेमोरी में भरा गया। जिससे आवश्यक सूचनाओं को वैज्ञानिक एवं ब्यूरो की आवश्यकतानुसार भविष्य में सहजता से पुनः प्रिन्टर के माध्यम से प्राप्त किया जा सके।

भारत प्राकृतिक दृष्टि से मत्स्य जनक तत्व संसाधनों के क्षेत्र में अत्यन्त समृद्ध है। विगत वर्षों के प्राप्त मत्स्य उत्पादन आंकड़ों से पता चला है कि कुछ मत्स्य प्रजातियों की उपलब्धता में गिरावट आयी है। कुछ प्रजातियों को उनकी उपलब्धता एवं अन्य जानकारी के आधार पर लुप्तप्राय, लुप्तोन्मुख एवं दुर्लभ श्रेणी में रखा गया है।

केन्द्रीय अन्तर्स्थलीय मत्स्य प्रग्रहण शोध संस्थान के नदीय प्रभाग की सहकार्यता में विभिन्न नदियों के गहरे तलीय भागों (डीप पूल्स) का सर्वेक्षण कार्य प्रगति पर है। सर्वेक्षणों से विभिन्न नदीय अंचलों में 36 डीप पूल्स की जानकारी प्राप्त की गयी है। इनमें से इलाहाबाद स्थित दो को अग्रिम विस्तृत अध्ययन के लिए चुना गया है। अध्ययन से प्राप्त इन जानकारियों की मत्स्य आनुवंशिक संसाधनों के संरक्षण योजनाओं एवं अन्य सम्बन्धित क्रियान्वयन पहलुओं के लिए महत्वपूर्ण भूमिका होगी।

### 13.2.3 पहाड़ी जल स्रोतों में महाशीर मछलियों का संरक्षण :

देश के विभिन्न प्रान्तों उत्तर प्रदेश, हिमाचल प्रदेश और पूर्वोत्तर राज्यों में महाशीर मछलियों का स्तर निश्चित करने के लिये और उनके समुचित संरक्षण हेतु विभिन्न स्रोतों से उनकी उपलब्धता की प्राथमिक जानकारी प्राप्त की गई जो निम्न प्रकार है :

#### उत्तर प्रदेश :

प्रदेश के नैनीताल जिले में स्थित विभिन्न जलस्रोतों, भीम ताल, नौकुचिया ताल एवं सातताल जलाशयों से प्राप्त आंकड़े एकत्रित किये गये। आंकड़ों के विश्लेषण एवं अध्ययन से यह पता चलता है कि महाशीर की प्रजातियां टोर टोर एवं टोर पूटीटोरा के उत्पादन में निरन्तर गिरावट आयी है। इन जलाशयों में अंगुलिकाओं के संचय एवं मछली पकड़ने के प्रयासों में 250 प्रतिशत तक वृद्धि के बावजूद भी इन प्रजातियों के उत्पादन में गिरावट देखी गई है। जो कि इस क्षेत्र में इन प्रजातियों के समग्र उत्पादन में हो रही भारी गिरावट की सूचक है।

#### हिमाचल प्रदेश :

ब्यूरो द्वारा किये गये सर्वेक्षण के दौरान कांगड़ा स्थित पौंग जलाशय और बिलासपुर स्थित गोविन्दसागर जलाशयों से महाशीर मछलियों की उपलब्धता सम्बन्धी प्राप्त आंकड़े एकत्र किये गये। आंकड़ों के विश्लेषण से यह पता चलता है कि दोनों जलाशयों में महाशीर, टोर पूटीटोरा के उत्पादन में, मछली पकड़ने के प्रयासों में वृद्धि के बावजूद भी कमी आई है जो कि एक चिन्ता का विषय है।

इन परिस्थितियों को ध्यान में रखते हुए हिमाचल प्रदेश सरकार ने कुछ समुचित कदम उठाये हैं जैसे कुछ जल स्रोतों में प्रतिबन्धित मछली पकड़ने का समय (क्लोर्ड फिसिंग सीजन), इसके अतिरिक्त अंगुलिकाओं का संचय एवं सैक्चुरी (निषिद्ध क्षेत्र) घोषित किये जाने की भी योजनाएं हैं।

## पूर्वोत्तर राज्य :

मेघालय, असम एवं अरुणाचल प्रदेश से महाशीर मछलियों के प्राप्त आंकड़े एकत्रित किये गये। प्राप्त आंकड़ों के अध्ययन एवं विश्लेषण से पता चलता है कि उपरोक्त तीनों राज्यों में महाशीर मछली के उत्पादन में कमी आयी है। असम के जोरहट आगत केन्द्र में पिछले तीन वर्षों में महाशीर का उत्पादन आधे से भी ज्यादा कम हो गया है।

पूर्वी एवं पूर्वोत्तर राज्यों में महाशीर के उत्पादन में गिरावट के प्रमुख कारणों का पता लगाने, संरक्षण योजनाओं एवं उनके क्रियान्वयन सम्बन्धी अध्ययन प्रगति पर है।

### 13.2.4 एकॉलगी (मोनोसेक्स) एवं निर्जीवाणुक (स्टेराइल) समुदाय का उत्पादन :

तिलापिया मछलियों की ओरियोक्रोमिस मोजाम्बिकस प्रजाति का नियंत्रित प्रजनन ब्यूरो की जल प्रयोगशाला में कराया गया है। लिंग परिवर्तन के इस प्रयोग में तिलापिया की इस प्रजाति के 7 से 10 दिन पुराने जीवों को हारमोन युक्त भोजन खिलाकर मादा से नर में परिवर्तित करने सम्बन्धी अध्ययन किया जा रहा है।

### 13.2.5 भारतीय मेजर कार्प, कुछ वायु-श्वासी एवं लुप्तप्राय मछलियों का कोशिकानुवंशिकीय अध्ययन :

विगत वर्ष गुणसूत्र (क्रोमोसोम) पर एन०ओ०आर० के सही स्थिति का ज्ञान करने सम्बन्धी अध्ययन विभिन्न प्रजातियों पर किये गये। रोहू और बाटा प्रजातियों में गुणसूत्रों पर एन०ओ०आर० की स्थिति ज्ञात की गयी। कुछ उपचारकों के प्रयोग से लेबियो बाटा, मिस्टस विटैटस, कतला कतला, लेबियो कालबासु और सिरिहिनस मृगला के माइटोटिक इन्डेक्स को बढ़ाने में सफलता प्राप्त की गयी।

उत्तर प्रदेश के श्रीनगर, गढ़वाल और हल्द्वानी क्षेत्रों से इकट्ठा किये गये विभिन्न प्रजातियों जैसे साइजोथोरेक्स प्लेगिस्टोमस, साइजोथोरेक्स रिचर्डसोनी, वैरिलियस वेन्डेलेसिस, टोर पूटीटोरा और गारा गोटिला के मेटाफेज स्तर पर अध्ययन किये गये। इनके विश्लेषण कार्य प्रगति पर हैं। इन परिणामों के आधार पर इन प्रजातियों की कैरियोटाइप एवं द्विगुणित (डिप्लायड) संख्या ज्ञात की जा सकेगी।

मत्स्य गुणसूत्र में जी बैंड एवं सी बैंड की उपयोगिता से सम्बन्धित अध्ययन भी प्रगति पर हैं। मत्स्य गुणसूत्र के अति सूक्ष्म होने के कारण जी बैंड बहुत उपयोगी नहीं है। इसका प्रयोग तुलनात्मक रूप से बड़े गुणसूत्रों के अध्ययन में ही किया जा सकता है। सी बैंडिंग से सम्बन्धित अध्ययनों के अब तक प्राप्त परिणाम अधिक सन्तोषप्रद नहीं हैं। इन पर आगे अध्ययन एवं प्रयोग अभी चल रहे हैं।

### 13.2.6 भारतीय मुख्य कार्प मछलियों के अंडे एवं भ्रूणों का हिम परिरक्षण :

मछलियों के जीन बैंकिंग के लिए इन अध्ययनों का विशेष महत्व है। इस क्षेत्र में अंडे एवं भ्रूण परिरक्षण की विधियों का अभी तक अभाव है। ब्यूरो ने इस तकनीकी बाधा को दूर करने हेतु इस क्षेत्र में शोध कार्य आरम्भ किये हैं।

मुख्य कार्प साइप्रिनस कार्पियो के भ्रूणों पर विभिन्न हिम परिरक्षकों (क्रायोप्रोटेक्टेंट्स) के प्रभावों का अध्ययन किया गया। प्रयोगों के परिणामों से पता चलता है कि कामन कार्प का एक घंटा पुराना भ्रूण सुक्रोज के प्रति एवं 10 घंटा पुराना भ्रूण डी०एम०एस०ओ० हिम परिरक्षक के प्रति प्रतिरोध उपयुक्त पाया गया। भ्रूणों के विभिन्न जीवन स्तर पर किये गये प्रयोगों से पता चलता है कि



मेथेनाल की क्रिया से भ्रूण के दोनों स्तरों (टेल एवं बड) पर जीवन क्षमता टू एम (दो मोलर) सान्द्रता सीमा तक सुरक्षित पायी गयी। द्रव नाइट्रोजन में हिम परिरक्षित भ्रूण हिमद्रवन (थाइंग) के बाद जीवित नहीं पाये गये। कारणों की जानकारी के लिये अध्ययन किये जा रहे हैं।

### 13.2.7 भारतीय मुख्य कार्प और अन्य मछलियों में तुलनात्मक जीव रासायनिक आनुवंशिकीय अध्ययन :

मुख्य कार्प के सामुदायिक आनुवंशिकी ढांचे को समझने के लिये जीव रासायनिक आनुवंशिक चिह्नों के अध्ययन पर बल दिया गया। इंजाइम आधारित पद्धति के अन्तर्गत 18 आइसोजाइम का पता लगाया गया। एस०डी०एस०—पी०ए०जी०ई० का भी अध्ययन किया गया। वैद्युतकरण संचयन (इलेक्ट्रोफोरेसिस) विधि से मानकीकरण कार्य इस अवधि में १२ आइसोजाइम पर किया गया। इस अध्ययन के परिणामों से पता चलता है कि प्रत्येक इंजाइम के लिये विशिष्ट बैंड का पता लगाना एवं अभिरंजन (स्टेनिंग) में परिवर्तन करके प्रत्येक इंजाइम में अन्तर पता करना भी सम्भव है।

तीन मुख्य कार्प मछलियों में एस०ओ०डी० और पी०वी०डी०एच० इंजाइम के साथ-साथ कुछ अन्य इंजाइम के परीक्षण में भी प्रजाति विशिष्ट नमूने देखे गये। एस०डी०एस०—पी०ए०जी०ई० से भी प्रजातियों में अन्तर देखा गया। वायु-श्वसी मछलियों में भी इंजाइम परीक्षणों में प्रजाति विशिष्ट नमूने प्राप्त हुए हैं।

विकसित जीव रसायन आनुवंशिकी तकनीक से ईपीजूटिक अल्सरेटिव सिन्ड्रोम जैसी महामारियों के आनुवंशिकी प्रारूप का भी अध्ययन किया गया। रोगग्रस्त मछलियों में इंजाइम स्तर पर कोई अन्तर नहीं पाया गया।

### वैज्ञानिक प्रकाशन :

उक्त अवधि में ब्यूरो ने अन्य सामान्य प्रकाशनों के अतिरिक्त 26 मूल वैज्ञानिक पेपर विभिन्न प्रतिष्ठित जर्नलों एवं वैज्ञानिक संसद पत्रिकाओं इत्यादि में प्रकाशित किये।

### 13.3 प्रौद्योगिकी हस्तान्तरण :

#### 13.3.1 मत्स्य उद्योग में परामर्श :

मत्स्य पालन सम्बन्धी विभिन्न पहलुओं पर इच्छुक मत्स्य पालकों को आवश्यक तकनीकी सुझाव ब्यूरो द्वारा प्रदान किये गये तथा आवश्यकतानुसार मत्स्य पालकों के तालाबों का भी निरीक्षण कर आवश्यक परामर्श का निस्तारण किया गया।

#### 13.3.2 उल्लेखनीय आधुनिक मत्स्य पालन का प्रदर्शन :

प्रसार कार्य के अन्तर्गत उच्च तकनीकी एवं अच्छे रख रखाव द्वारा अधिक से अधिक मत्स्योत्पादन लिये जाने का सफल प्रदर्शन फतेहपुर जनपद में चुने गये दो मत्स्य पालकों के तालाबों पर किया गया। इन तालाबों में भारतीय मुख्य कार्प (कतला, रोहू और मृगल) और दो विदेशी मछली (सिल्वर कार्प और कामन कार्प) को एक साथ साल भर तक आधुनिक पद्धति से पाला गया। एक वर्ष की उपलब्धि स्थानीय मत्स्य पालकों, जनपद के मुख्य विकास अधिकारी, मुख्य कार्यकारी अधिकारी, मत्स्य पालन, ग्राम प्रधान तथा ब्लाक प्रमुख के समक्ष दिखाया गया। दोनों तालाबों की वार्षिक मत्स्योत्पादन दर निम्नवत रही।

1. 0.34 हे० तालाब में 7187 किग्रा/हे./वर्ष
2. 0.66 हे० तालाब में 7995 किग्रा/हे./वर्ष

#### 13.3.3 अन्य कार्य कलाप :

##### मछलियों में ईपीजूटिक अल्सरेटिव सिन्ड्रोम रोग :

इलाहाबाद जनपद के 16 तालाबों में मछलियों में ईपीजूटिक अल्सरेटिव सिन्ड्रोम रोग देखा गया। रोग के कारणों का पता लगाने एवं उनसे बचाव सम्बन्धी अध्ययन किये गये। कुछ तालाबों में इस रोग के कारण मछलियों की मृत्यु देखी गई। इनसे बचने के उपाय एवं उपचार हेतु मत्स्य पालकों को सलाह दी गई। रोजाना 2-3 प्रतिशत मछलियों के शरीर के भार के बराबर पौष्टिक परिपूरक आहार एवं 150 किग्रा प्रति हे० चूने का चार बार प्रयोग 15 दिन के अन्तराल पर इस रोग से बचने हेतु सुझाया गया। बीमार मछलियों के उपचार हेतु नमक की दो खुराक 75 किग्रा प्रति हेक्टेअर की दर से एक-एक महीने के अन्तराल पर और पोटैसियम परमैंगेनेट की एक मिलीग्राम प्रति लीटर की दर से प्रति तीसरे दिन दो सप्ताह तक देना सुझाया गया। यह देखा गया कि एक माह के अन्दर इस रोग का फैलना रुक गया एवं 3 माह के अन्दर पूरी तरह से यह रोग धीरे-धीरे समाप्त हो गया।

##### विश्व पर्यावरण दिवस :

ब्यूरो में 5 जून 1990 को विश्व पर्यावरण दिवस मनाया गया जिसमें वैज्ञानिकों तथा तकनीकी विशेषज्ञों ने सम्मिलित होकर अपने विचार प्रकट किये।



## Appendix—I

**Statement showing the total number of employees and member of the Scheduled Castes and Scheduled Tribes amongst them as on 31.3.1991**

Group/Class	Total No. of Employees	Sched- uled Castes	Percen- tage of S.C.	Sched- uled Tribes	Percen- tage of S.T.
<b>Group 'A' (Class—I)</b>					
1. Director	1	—	—	—	—
2. Principal Scientist	2*	—	—	—	—
3. Scientist (Sel. Grade)	3	—	—	—	—
4. Scientist (Sr. Scale)	2	—	—	—	—
5. Scientist	2	—	—	—	—
6. Asstt. Farm Manager (T-6)	1	—	—	—	—
*One Scientist is on deputation to NEC, Shillong					
<b>Group 'B' (Class-II)</b>					
1. Asstt. Finance & Accounts Officer	1	—	—	—	—
2. Librarian, T-5. (T.O)	1	—	—	—	—
3. Superintendent	1	—	—	1	100%

Group/Class	Total No. of Employees	Sched-uled Castes	Percen- tage of S.C.	Sched- uled Tribes	Percen- tage of S.T.
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**Group 'C' (Class-III)**

1. Technical T-4	8	1	12.5	1	12.5
2. Technical T-II-3	1	—	—	—	—
3. Technical T-2	2	—	—	—	—
4. Technical T-1	5	2	40%	1	20%
5. Stenographer	1	—	—	—	—
6. Assistant	1	—	—	—	—
7. Sr. Clerk	2*	1	50%	—	—
8. Jr. Clerk	3	1	33.3%	—	—
9. Driver	2	1	50%	—	—

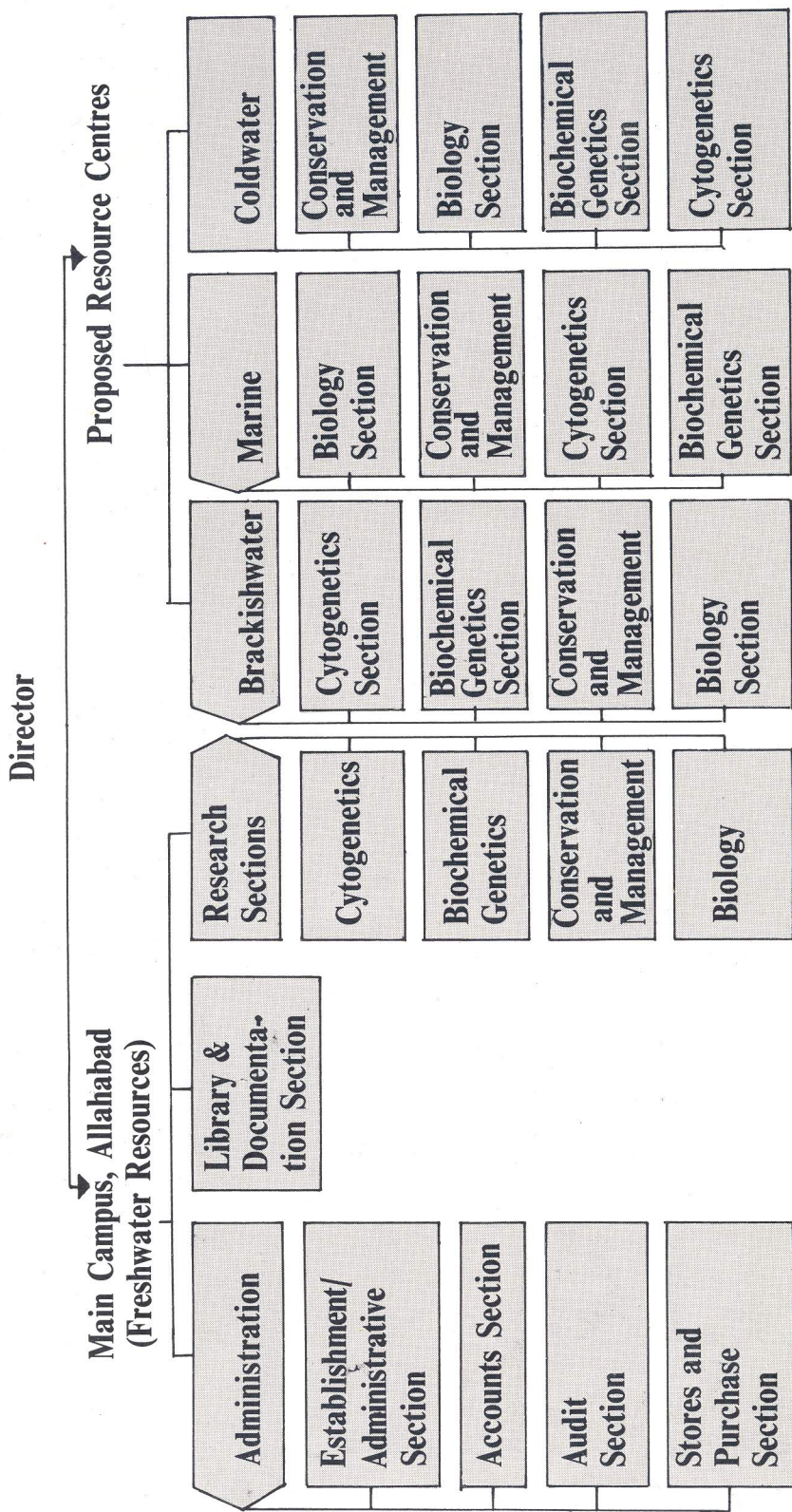
\*One Sr. Clerk is on deputation to TOT Project, Kanpur

**Group 'D' (Class-IV)**

1. Fisherman	4	—	—	1	25%
2. Lab. Attendant	2	—	—	—	—
3. Fieldman	2	1	50%	—	—
4. Messenger	1	—	—	—	—
5. Safaiwala	2	2	100%	—	—



# Appendix-II : Organisational Chart



The Research Sections would be elevated to Research Divisions when adequate number of scientists come in position during the VIII Plan period.