Progress Report for R&D Projects [Year 1/2/3]*

(11th Dec., 2014 – 30th Jun., 2018)

Section-A : Project Details

A1. **Project Title:** Characterization and DNA Barcoding of fishes from Mizoram

A2. **DBT Sanction Order No. & Date:** No. BT/388/NE/TBP/2012 dated 11-12-2014

A3. **Name of Principal Investigator:**

Northeast: LALRAMLIANA
Outside Northeast: MAHENDER SINGH
Name of Co-PI/Co-Investigator: NIL

A4. **Institute:**

Northeast: Pachhunga University College
Outside Northeast: National Bureau of Fish Genetic resource

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A6. Total Cost: **Rs. 51.35 lakhs**

Northeast: Rs. 28.5

Outside Northeast: Rs. 22.85

A7. Duration: 3 years (2014-2017) extended till June 2018.

A8.Approved Objectives of the Project:

- Validation of species' morphometric data and generation of reference voucher library.
- Use of COI and Cyt b gene sequence data for genetic diversity studies of 70 commercially important and ornamental fish species in Mizoram.
- To develop a reference database of DNA Barcodes of 70 species, freely available on web.

A9. Specific Recommendations made by the Task Force (if any): NA

Section-B : Scientific and Technical Progress

B1. Progress made against the Approved Objectives, Targets & Timelines during the Reporting Period

(1000-1500 words for interim reports; 2500-3500 words for final report; data must be included in the form of up to 3 figures and/or tables for interim reports; up to 7 figures and/or tables for final reports)

***Recruitment of Staff & Purchase of equipments*:**

Two staff (1 JRF/SRF and 1 Lab attendant) for Pachhunga University College (Northeast Institution) and one staff (1 JRF/SRF) for NBFGR, Lucknow (outside Northeast Institution) were recruited. The list and details of equipment purchased were shown in the annexure attached.

***Survey*:**

Mizoram is endowed with three drainage system*viz* The Barak river drainage, The Karnaphuli drainage and The Kaladan basin. The first year of the research project covered the Barak drainage (encircled by a blue line in the map Fig. 1) where 29 sites from 7 major river tributaries (*Langkaih, Teirei, Tut, Tlawng, Tuirial, Tuivawl* and *Tuivai* Rivers), the second year covered the Kaladan drainage (encircled by a red line in the map Fig. 1)where 26 sites from 10 major river tributaries (*Kaladan, Ngengpui, Mat, Tiau, Tuisi, Tuichang, Khawchhak Tuipui, Sala* and *Sekhum* Rivers) and the third year covered the Karnaphuli drainage (encircled by a green line in the map Fig. 1) where 24 sites from 9 major river tributaries (*Karnaphuli, Mar, Keisalam, Aivapui, Seling, De, Tuichawng, Tuipawl* and *Kau* Rivers) of Mizoram were surveyed. Each site had been visited once each, however, some rivers were visited during the first and second year were revisited during the third year. Fishes were collected using cast net, drag net and other local catching methods. Live photograph of collected fishes were taken in the photo tank using DSLR Camera (Nikon D-7000). Depending on the availability of the specimens, 4-5 samples were preserved in good quality alcohol and another 4-5 samples were preserved in formaldehyde for further morphological assessment in the laboratory. The preservative, alcohol, is changed once (after one week) for reducing contamination and longer preservation. Samples from different collection localities (though belonging to the same species) were preserved separately in both alcohol and formalin to analyze, if any, variation in gene composition and morphology.

***Fish identification*:**

Fishes were identified following relevant literature (Menon 1987, Jayaram 1990, Talwar & Jinghran, 1991, Kottelat 1994 etc) and physical comparisons with type and non-type specimens from ZSI Kolkata, ZSI Shillong and other museums. Altogether 120 different species comprising of 636 specimens (based on morphology only) were collected under 5 orders and 16 families. The order Cypriniformes (55.83 %) dominated the composition followed by Siluriformes (27.5 %), Perciformes (11.67 %), Beloniformes (1.67 %) and Synbranchiformes (0.83 %). The study resulted in the description of new species viz., *Laubuka parafasciata*, from Mizoram (**Zootaxa**, 4244(2):269-276), *Neolissochiluskaladanensis* (**Mit. DNA A**doi: 10.1080/24701394.2018.1450398) and *Channastiktos* (**Vertebrate Zoology**, 68 (2): 165 –175) are described in SCI index journal.

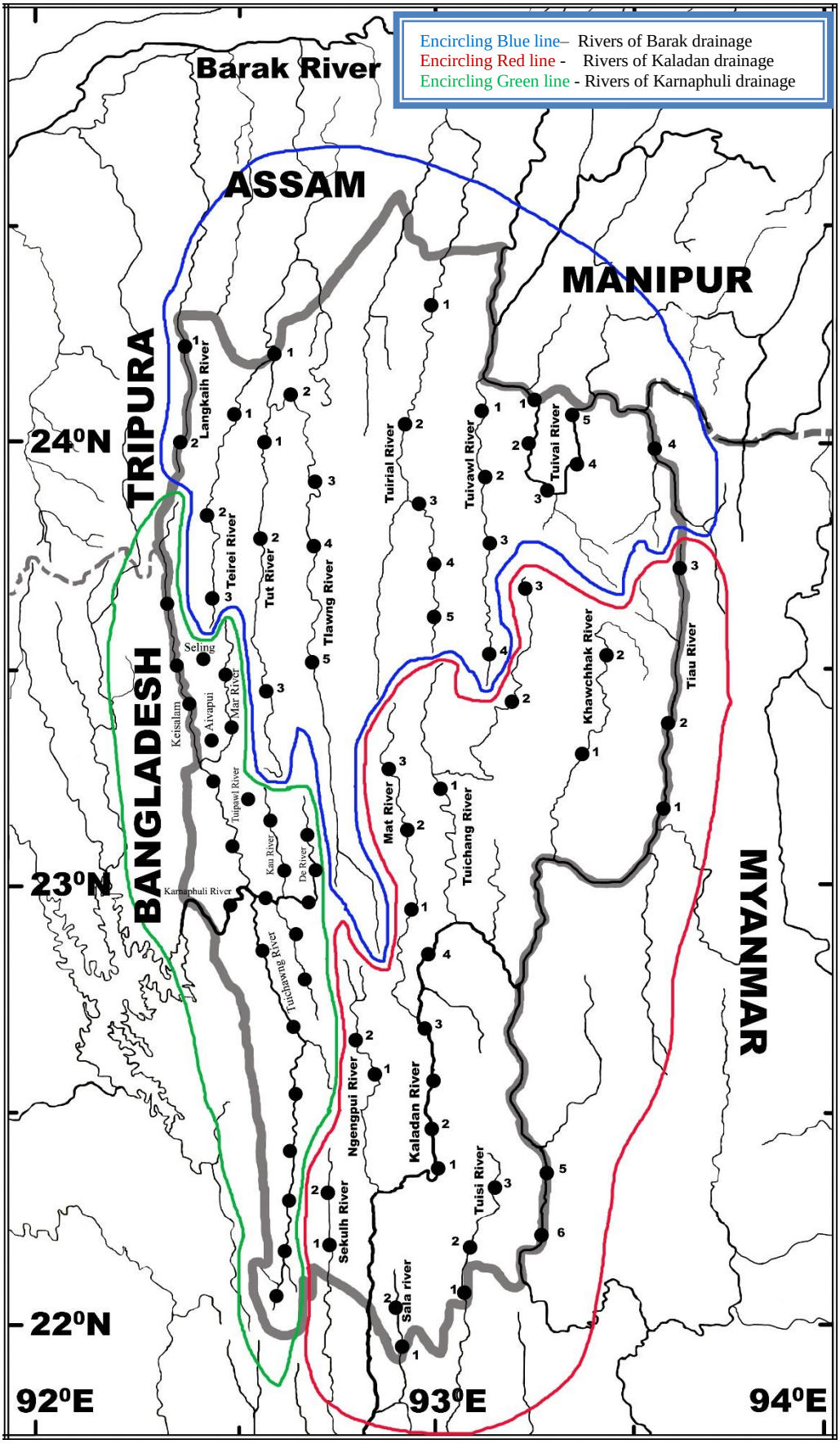

Fig.1: Map of River system of Mizoram showing different drainage and collection spots

Table 1: List of fishes from Rivers of Mizoram

Sl. No.	Scientific name	Karnaphuli	Kaladan	Barak
A.	**ORDER: BELONIFORMES**			
I.	**Family: Belonidae**			
1.	*Xenentodoncancila*	+	-	+
2.	*Xenentodon*cf. *cancila*	-	+	-
B.	**ORDER: CYPRINIFORMES**			
II.	**Family: Balitoridae**			
3.	*Balitora*cf. *brucei*	-	-	+
4.	*Balitora*sp. Kaladan	-	+	-
5.	*Balitora*sp. Mar	+	-	-
III.	**Family: Cobitidae**			
6	*Botia*cf. *dario*	-	-	+
7	*Lepidocephalichthys*cf. *berdmorei*	-	-	+
8	*Lepidocephalichthys*sp.	+	-	+
9	*Pangio*sp.	+	-	+
10	*Pangio*cf. *pangia*	-	+	-
IV.	**Family: Cyprinidae**			
11	*Amblypharyngodon*sp.	-	-	+
12.	*Bariliusbarila*	-	-	+
13.	*Bariliusbendelisis*	+	-	+
14.	*Barilius*sp.	-	+	-
15.	*Cabdiomorar*	-	-	+
16.	*Cabdio*sp.	-	+	-
17.	*Cirrhinusreba*	-	-	+
18	*Danio*cf.*dangila*	+	-	+
19.	*Devarioaequipinnatus*	+	-	+
20.	*Esomusdanricus*	+	-	-
21.	*Garradampaensis*	+	-	-
22.	*Garra*cf. *lissorhynchus*	-	-	+
23	*Garra*cf. *nigricollis*	+	-	-
24	*Garrakoladynensis*	-	+	-
25	*Garramanipurensis*	-	+	+
26	*Garrarakhinica*	-	+	-
27	*Garra*cf. *annandalei*	-	-	+
28	*Garra* cf. *clavirostris*	-	-	+
29	*Garra*sp. Tuivai 1	-	-	+
30	*Garra*sp. Tuivai 2	-	-	+
31	*Garra*sp. Seling	+	-	-
32	*Garra*sp. Phuldungsei	+	-	-
33	*Garra* sp. Tuirial	-	-	+
34	*Garra* sp. Teirei	-	-	+
35	*Garra*sp. Kaladan	-	+	-
36	*Neolissochiluskaladanensis*	-	+	-
37	*Neolissocheilus*sp. 1	+	-	+
38	*Neolissocheilus*sp. 2	-	+	+
39	*Neolissocheilus*sp. 3	-	+	-
40	*Neolissocheilus*sp. 4	+	-	+

41	*Opsariusbarna*	+	-	-
42	*Opsariusprofundus*	-	+	-
43	*Opsariustileo*	-	-	+
44	*Pethiaconchonius*	-	-	+
45	*Poropuntius*sp. 1	-	-	+
46	*Poropuntius*sp. 2	-	-	+
47	*Puntius chola*	+	-	-
48	*Rasbora daniconius*	+	-	+
49	*Salmostoma*sp. 1	+	+	-
50	*Salmostoma*sp. 2	-	-	+
51	*Semiplotusmodestus*	-	+	-
52	*Tariqilabeolatius*	-	-	+
53	*Tariqilabeo*sp.	-	+	-
54	*Torbarakae*	-	-	+
V.	**Family: Nemacheilidae**			
55	*Neonoemacheilusassamensis*	-	-	+
56	*Paracanthocobitis*sp.	+	-	-
57	*Physoschisturatuivaiensis*	-	-	+
58	*Physoschisturachhimtuipuiensis*	-	+	-
59	*Physoschistura*sp.	+	-	-
60	*Schisturaaizawlensis*	-	-	+
61	*Schisturafasciata*	-	-	+
62	*Schistura*cf. *fasciata*	+	-	-
63	*Schisturakoladynensis*	-	+	-
64	*Schisturanebeshwari*	-	+	-
65	*Schisturapaucireticulata*	-	-	+
66	*Schistura* cf. *paucireticulata*	+	-	-
67	*Schisturascyphovecteta*	-	+	-
VI.	**Family: Psilorhynchidae**			
68	*Psilorhynchus*cf. *homaloptera*	-	-	+
69	*Psilorhynchus*cf. *khopai*	-	+	-
70	*Psilorhynchusnudithoracicus*	-	-	+
71	*Psilorhynchusrahmani*	+	+	-
72	*Psilorhynchussucatio*	-	-	+
C.	**ORDER: PERCIFORMES**			
VII.	**Family: Badidae**			
73	*Badischittagongis*	+	-	+
74	*Badis*cf. *tuivaiei*	-	-	+
VIII.	**Family: Chandidae**			
75	*Parambasisserrata*	-	+	-
76	*Parambasis*sp.	-	-	+
IX.	**Family: Channidae**			
77	*Channaaurantipectoralis*	+	-	-
78	*Channastiktos*	-	+	-
79	*Channa*cf. *gachua*	-	-	+
80	*Channapunctata*	-	-	+
81	*Channa*sp. Spotted Kaladan	-	+	-
82	*Channa*sp. Tuipawl	+	-	-

83	*Channas*p. Kaladan	-	+	-
84	*Channas*p. Tlawng	-	-	+
X.	**Family: Gobiidae**			
85	*Awaous*cf. *gutum*	-	+	-
86	*Glossogobiusgiuris*	+	-	+
D.	**ORDER: SILURIFORMES**			
XI	**Family: Amblycipitidae**			
87	*Amblycepsarunachalensis*	-	-	+
88	*Amblycepsmangois*	-	-	+
89	*Amblyceps*sp.	-	+	-
XII	**Family: Bagridae**			
90	*Batasioconvexirostrum*	-	+	-
91	*Batasio*sp.	+	-	-
92	*Mystusbleekeri*	+	-	+
93	*Olyrasaginata*	-	+	-
94	*Olyra*cf. *praestigiosa*	-	-	+
95	*Speratas*p.	-	+	-
XIII.	**Family: Clariidae**			
96	*Clariasmagur*	-	-	+
97	*Heteropneustes*sp. 1	+	-	+
98	*Heteropneustes*sp. 2	+	-	-
XIV.	**Family: Siluridae**			
99	*Pterocryptis*sp.	-	+	-
XV	**Family: Sissoridae**			
100	*Bagarius* sp.	-	+	-
101	*Gogangraviridescens*	-	-	+
102	*Glyptothorax*cf. *ater*	-	+	-
103	*Glyptothoraxchimtuipuiensis*	-	+	-
104	*Glyptothoraxchuramanii*	-	+	-
105	*Glyptothorax*cf. *dikrongensis*	-	-	+
106	*Glyptothoraxjayarami*	-	+	-
107	*Glyptothoraxmaceriatus*	-	-	+
108	*Glyptothoraxmanipurencis*	-	-	+
109	*Glyptothoraxtelchitta*	-	-	+
110	*Glyptothoraxverrucosus*	-	+	-
111	*Glyptothorax*sp. Teirei	-	-	+
112	*Glyptothorax*sp. Tlawng	-	-	+
113	*Glyptothorax*sp.	+	+	-
114	*Hara hara*	-	-	+
115	*Pseudecheneiskoladynae*	-	+	-
116	*Pseudolaguvia spicula*	-	-	+
117	*Pseudolaguviavirgulata*	-	-	+
118	*Pseudolaguvia*sp.	-	-	+
119	*Sisor*sp.	-	-	+
E.	**ORDER: SYNBRANCHIFORMES**			
XVI	**Family: Mastacembelidae**			
120	*Mastacembelusarmatus*	+	+	+

Processing of tissue samples for extraction of DNA, PCR amplification of Cytochrome c oxidase I (COI) and cytchrome b:

- DNA Extraction was completed for all the tissues collected. PCR amplification and DNA sequencing completed for 679 samples of 76 species for Cytochrome oxidase I and 597 samples of 73 species for cytchrome b gene. Phylogenetic analysis was done for twelve Genera namely *Amblyceps; Barilius*; *Tariqilabeo*; *Glyptothorax*; *Garra; Laubuka; Lepidocephalichthys; Neolissochilus; Pethia*; *Pseudolaguvia*; *Psilorhynchus*; and *Schistura*. Pairwise evolutionary distance among haplotypes was determined by the Kimura 2-Parameter method using the software program MEGA6 (Molecular Evolutionary Genetics Analysis). *Neolissochilus kaladanensis* sp. nov., a new cyprinid species, is described from the Kaladan River drainage of Mizoram. It differs from all other valid *Neolissochilus* species in having higher number of gill rakers on the lower arm of the first gill arch (13-14 vs. 12 or below in all the species). The analysis of mitochondrial gene cytochrome c oxidase subunit I (COI) sequences, separated *N. kaladanensis* sp. nov. from all other *Neolissochilus* and *Tor* species with an average genetic distance of 6.0 %. It is further separated from the morphologically most similar species *N. hendersoni* and *N. soroides* by a genetic distance of 6.7% and 6.8% respectively.

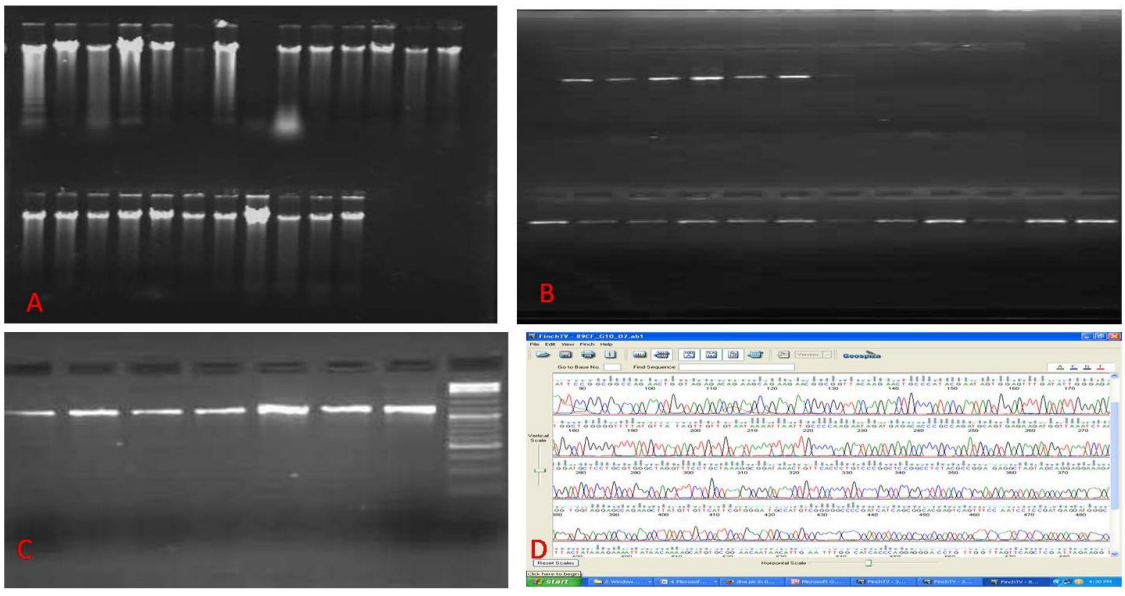

Fig. 2: A. Genomic DNA on 0.7% Agarose gel; **B.** PCR product of *COI* on 1.5% Agarose gel; **C.** PCR product of *cyt b* on 1.5% Agarose gel; **D.** Electropherogram of *COI.*

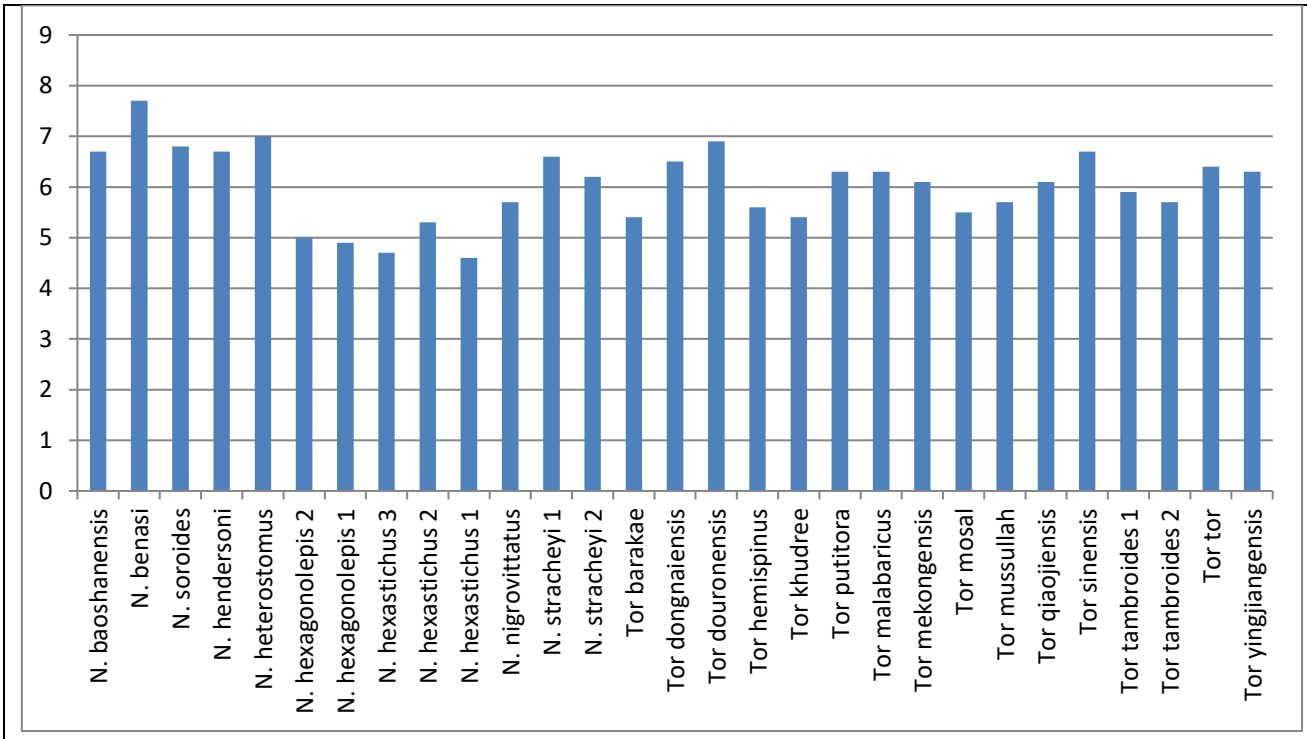

Figure 3. Percent Genetic distance (Y-axis) of *Neolissochilus* sp. as calculated against 24 species/ clades of *Neolissochilus* and *Tor* genus (X-axis).

Development of a reference database of DNA Barcodes of 70 species.

In total 120 Tentative species found in Mizoram during three years exploration in the project are arranged in datasheets. Geographical locations of distribution of these species have been recorded in the form of latitude and longitude. DNA sequences of Cytochrome oxidase I gene of 679 samples of 76 species and cytchrome b gene of 597 samples of 73 species have been refined. These sequences have been tagged with geographical locations and photographs of respective fish voucher specimens. Vouchers are being compared with published literature and holotypes in ZSI. Once all the specimens are confirmed upto species level, this information will be made available on official web pages of ICAR-NBFGR and Mizoram University.

Table 2: Partial List of 120 tentative species studied for molecular characterization

Species No.	Serial No.	Voucher & Tissue Code	Species Name	River	LatLong
1	1	MF17F	*Xenentodon* cf. *canciloides*	Kaladan	22.461N92.937E
2	2	MF215A	*Xenentodon cancila*	De	22.951N92.616E
	3	MF215B	*Xenentodon cancila*	De	22.951N92.616E
	4	MF215C	*Xenentodon cancila*	De	22.951N92.616E
3	5	MF14G	*Balitora* sp. Mar	Mar	23.469N92.451E
	6	MF14H	*Balitora* sp. Mar	Mar	23.469N92.451E
	7	MF14I	*Balitora* sp. Mar	Mar	23.469N92.451E
	8	MF14J	*Balitora* sp. Mar	Mar	23.469N92.451E
	9	MF14D	*Balitora* sp. Mar	Mar	23.469N92.451E
	10	MF14E	*Balitora* sp. Mar	Mar	23.469N92.451E
	11	MF14F	*Balitora* sp. Mar	Mar	23.469N92.451E
4	12	MF14A	*Balitora* cf. *brucei*	Tuirial	23.764N92.808E
	13	MF14B	*Balitora* cf. *brucei*	Tuirial	23.764N92.808E
	14	MF264A	*Balitora* cf. *brucei*	Tuirial	23.794N92.804E
5	15	MF46E	*Balitora* sp. Kaladan	Kaladan	22.461N92.937E
	16	MF46F	*Balitora* sp. Kaladan	Lungbun	22.469N93.131E
	17	MF46G	*Balitora* sp. Kaladan	Lungbun	22.461N92.937E
	18	MF46H	*Balitora* sp. Kaladan	Lungbun	22.461N92.937E
	19	MF46I	*Balitora* sp. Kaladan	Lungbun	22.461N92.937E
	20	MF46J	*Balitora* sp. Kaladan	Lungbun	22.461N92.937E
	21	MF245A	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	22	MF245B	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	23	MF245C	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	24	MF245D	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	25	MF245E	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	26	MF245F	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
	27	MF245G	*Balitora* sp. Kaladan	Kawlchaw	22.413N92.947E
6	28	MF93A	*Botia* cf. *dario*	Langkaih	23.927N92.320E
7	29	MF27A	*Lepidocephalichthys* sp.	Teirei	24.096N92.478E
	30	MF27C	*Lepidocephalichthys* sp.	Teirei	24.096N92.478E
	31	MF223A	*Lepidocephalichthys* sp.	Tuipawl Kau	23.027N92.598E
	32	MF223B	*Lepidocephalichthys* sp.	Tuipawl Kau	23.027N92.598E
	33	MF223C	*Lepidocephalichthys* sp.	Tuipawl Kau	23.027N92.598E
	34	MF223D	*Lepidocephalichthys* sp.	Tuipawl Kau	23.027N92.598E
8	35	MF27D	*Lepidocephalichthys* cf. *berdmorei*	Tuila	23.892N93.225E
	36	MF27F	*Lepidocephalichthys* cf. *berdmorei*	Tuila	23.892N93.225E

9	37	MF265B	*Pangio* sp.	Tuirial	23.794N92.804E
	38	MF265C	*Pangio* sp.	Tuirial	23.794N92.804E
10	39	MF265A	*Pangio* cf. *pangio*	Tuirial	23.794N92.804E
	40	MF221A	*Pangio* cf. *pangio*	De	22.951N92.616E
	41	MF221B	*Pangio* cf. *pangio*	Kawlchaw	22.413N92.947E
11	42	MF76A	*Amblypharyngodon* sp.	Lengpui Fish Farm	23.832N92.627E
12	43	MF5E	*Barilius barila*	Tuirial	23.764N92.808E
	44	MF129A	*Barilius barila*	Tuivai	23.842N93.137E
	45	MF129B	*Barilius barila*	Tuivai	23.842N93.137E
	46	MF129C	*Barilius barila*	Tuivai	23.842N93.137E
	47	MF129D	*Barilius barila*	Chhirdem	23.791N93.044E
	48	MF129F	*Barilius barila*	Teirei via Dampa	23.673N92.453E
	49	MF129M	*Barilius barila*	Teirei via Dampa	23.673N92.453E
13	50	MF5A	*Barilius bendelisis*	Tuirial	23.764N92.808E
	51	MF5B	*Barilius bendelisis*	Tuirial	23.764N92.808E
	52	MF5C	*Barilius bendelisis*	Tuirial	23.764N92.808E
	53	MF5D	*Barilius bendelisis*	Tuirial	23.764N92.808E
	54	MF5G	*Barilius bendelisis*	Teirei	24.096N92.478E
	55	MF5H	*Barilius bendelisis*	Teirei	24.096N92.478E
	56	MF5I	*Barilius bendelisis*	Aivapui	23.474N92.392E
	57	MF5J	*Barilius bendelisis*	Tuivai	23.842N93.137E
	58	MF5K	*Barilius bendelisis*	Tuivai	23.842N93.137E
	59	MF5L	*Barilius bendelisis*	Chhirdem	23.791N93.044E
	60	MF5N	*Barilius bendelisis*	Chhirdem	23.791N93.044E
	61	MF5O	*Barilius bendelisis*	Chhirdem	23.791N93.044E
	62	MF5P	*Barilius bendelisis*	Teirei via Dampa	23.673N92.453E
	63	MF5Q	*Barilius bendelisis*	Mar	23.480N92.450E
	64	MF5R	*Barilius bendelisis*	Mar	23.480N92.450E
	65	MF23I	*Barilius bendelisis*	Teirei via Sihthiang	24.196N92.322E
	66	MF208C	*Barilius bendelisis*	De	22.951N92.616E
	67	MF208D	*Barilius bendelisis*	De	22.951N92.616E
	68	MF208E	*Barilius bendelisis*	De	22.951N92.616E
14	69	MF148A	*Barilius* sp.	Kaladan	22.461N92.937E
	70	MF149A	*Barilius* sp.	Kaladan	22.461N92.937E
15	71	MF31A	*Cabdio morar*	Teirei	24.096N92.478E
	72	MF31B	*Cabdio morar*	Teirei	24.096N92.478E
	73	MF31C	*Cabdio morar*	Teirei	24.096N92.478E
	74	MF31E	*Cabdio morar*	Teirei	24.096N92.478E
16	75	MF3	*Cabdio* sp.	Kaladan	22.447N92.936E
	76	MF4	*Cabdio* sp.	Kaladan	22.447N92.936E
	77	MF5	*Cabdio* sp.	Kaladan	22.447N92.936E
	78	MF145C	*Cabdio* sp.	Kaladan	22.447N92.936E

	79	MF145D	*Cabdio* sp.	Kaladan	22.447N92.936E
	80	MF24A	*Cirrhinus reba*	Teirei	24.096N92.478E
	81	MF24B	*Cirrhinus reba*	Teirei	24.096N92.478E
17	82	MF24C	*Cirrhinus reba*	Teirei	24.096N92.478E
	83	MF35B	*Danio* cf. *dangila*	Tlawng	24.139N92.545E
	84	MF35L	*Danio* cf. *dangila*	Seling	23.671N92.374E
	85	MF35K	*Danio* cf. *dangila*	Seling	23.672N92.376E
	86	MF164A	*Danio* cf. *dangila*	Dampa (P)	23.524N92.380E
	87	MF164B	*Danio* cf. *dangila*	Dampa (P)	23.524N92.380E
	88	MF164C	*Danio* cf. *dangila*	Dampa (P)	23.524N92.380E
18	89	MF230A	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	90	MF230B	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	91	MF230C	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	92	MF230D	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	93	MF230E	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	94	MF230F	*Danio* cf. *dangila*	Tuipawl Kau	23.027N92.598E
	95	MF6A	*Devario aequipinnatus*	Tuirial	23.764N92.808E
	96	MF6B	*Devario aequipinnatus*	Tuirial	23.764N92.808E
	97	MF6C	*Devario aequipinnatus*	Tuirial	23.764N92.808E
	98	MF6D	*Devario aequipinnatus*	Tuirial	23.764N92.808E
	99	MF6E	*Devario aequipinnatus*	Teirei	24.096N92.478E
	100	MF6F	*Devario aequipinnatus*	Teirei	24.096N92.478E
	101	MF6G	*Devario aequipinnatus*	Teirei	24.096N92.478E
	102	MF6H	*Devario aequipinnatus*	Tuivai	23.842N93.137E
	103	MF6I	*Devario aequipinnatus*	Tuivai	23.842N93.137E
19	104	MF6J	*Devario aequipinnatus*	Tuivai	23.842N93.137E
	105	MF6K	*Devario aequipinnatus*	Tlawng	24.139N92.545E
	106	MF6L	*Devario aequipinnatus*	Tlawng	24.139N92.545E
	107	MF6M	*Devario aequipinnatus*	Tlawng	24.139N92.545E
	108	MF6P	*Devario aequipinnatus*	Chhirdem	23.791N93.044E
	109	MF6R	*Devario aequipinnatus*	Seling	23.657N92.383E
	110	MF6T	*Devario aequipinnatus*	Teirei(Dampa)	23.674N92.454E
	111	MF6U	*Devario aequipinnatus*	Teirei(Dampa)	23.674N92.454E
	112	MF234A	*Devario aequipinnatus*	Tuipawl Kau	23.027N92.598E
20	113	MF233A	*Esomus danricus*	Tuipawl Kau	23.027N92.598E
	114	MF233B	*Esomus danricus*	Tuipawl Kau	23.027N92.598E
	115	MF51A	*Garra dampaensis*	Seling	23.657N92.383E
	116	MF51B	*Garra dampaensis*	Seling	23.657N92.383E
21	117	MF51G	*Garra dampaensis*	Mar	23.480N92.450E
	118	MF51L	*Garra dampaensis*	Seling	23.657N92.383E
	119	MF51M	*Garra dampaensis*	Seling	23.657N92.383E
	120	MF53H	*Garra dampaensis*	Mar	23.469N92.451E

	121	MF137B	*Garra dampaensis*	Seling	23.671N92.374E
	122	MF137C	*Garra dampaensis*	Seling	23.671N92.374E
	123	MF137D	*Garra dampaensis*	Seling	23.671N92.374E
	124	MF137E	*Garra dampaensis*	Seling	23.671N92.374E
	125	MF137F	*Garra dampaensis*	Seling	23.671N92.374E
	126	MF137G	*Garra dampaensis*	Seling	23.671N92.374E
	127	MF137H	*Garra dampaensis*	Seling	23.671N92.374E
	128	MF137I	*Garra dampaensis*	Seling	23.671N92.374E
	129	MF137J	*Garra dampaensis*	Seling	23.671N92.374E
	130	MF214A	*Garra dampaensis*	De	22.951N92.616E
	131	MF214B	*Garra dampaensis*	De	22.951N92.616E
	132	MF214C	*Garra dampaensis*	De	22.951N92.616E
	133	MF214D	*Garra dampaensis*	De	22.951N92.616E
	134	MF214E	*Garra dampaensis*	De	22.951N92.616E
	135	MF214F	*Garra dampaensis*	De	22.951N92.616E
22	136	MF51D	*Garra* cf. *nigricolis*	Seling	23.671N92.374E
	137	MF51E	*Garra* cf. *nigricolis*	Seling	23.671N92.374E
	138	MF51H	*Garra* cf. *nigricolis*	Mar	23.469N92.451E
	139	MF51N	*Garra* cf. *nigricolis*	Mar	23.469N92.451E
	140	MF51O	*Garra* cf. *nigricolis*	Mar	23.469N92.451E
	141	MF51Q	*Garra* cf. *nigricolis*	Tuisi	23.182N93.043E
	142	MF51R	*Garra* cf. *nigricolis*	Tuisi	23.182N93.043E
23	143	MF9D	*Garra* cf. *lissorhyncus*	Tuivai	23.842N93.137E
	144	MF9E	*Garra* cf. *lissorhyncus*	Tuivai	23.842N93.137E
	145	MF9F	*Garra* cf. *lissorhyncus*	Tuivai	23.842N93.137E
24	146	MF240A	*Garra koladynensis*	Kawlchaw	22.413N92.947E
	147	MF240B	*Garra koladynensis*	Kawlchaw	22.413N92.947E
25	148	MF8A	*Garra manipurensis*	Tuirial	23.764N92.808E
	149	MF8C	*Garra manipurensis*	Tuirial	23.764N92.808E
	150	MF8D	*Garra manipurensis*	Tuirial	23.764N92.808E
	151	MF8E	*Garra manipurensis*	Tuirial	23.764N92.808E
	152	MF8I	*Garra manipurensis*	Tuivai	23.842N93.137E
	153	MF238A	*Garra manipurensis*	Kawlchaw	22.413N92.947E
	154	MF238C	*Garra manipurensis*	Kawlchaw	22.413N92.947E
	155	MF238D	*Garra manipurensis*	Kawlchaw	22.413N92.947E
	156	MF238F	*Garra manipurensis*	Kawlchaw	22.413N92.947E
26	157	MF43B	*Garra rakhinica*	Lungbun	22.469N93.131E
	158	MF238B	*Garra rakhinica*	Kawlchaw	22.413N92.947E
	159	MF238E	*Garra rakhinica*	Kawlchaw	22.413N92.947E
27	160	MF12A	*Garra* cf. *annandalei*	Tuirial	23.764N92.808E
	161	MF69A	*Garra* cf. *annandalei*	Tuirial	23.764N92.808E
	162	MF69B	*Garra* cf. *annandalei*	Tuirial	23.764N92.808E

	163	MF87A	*Garra* cf. *annandalei*	Tlawng via Sairang	23.808N92.647E
	164	MF258A	*Garra* cf. *annandalei*	Tuirial	23.794N92.804E
28	165	MF34A	*Garra* cf. *clavirostris*	Tlawng	24.139N92.545E
	166	MF34B	*Garra* cf. *clavirostris*	Tlawng	24.139N92.545E
	167	MF34C	*Garra* cf. *clavirostris*	Tlawng via Sairang	23.808N92.647E
	168	MF34D	*Garra* cf. *clavirostris*	Tlawng via Sairang	23.808N92.647E
	169	MF66A	*Garra* cf. *clavirostris*	Teirei via Sihthiang	24.196N92.322E
	170	MF100A	*Garra* cf. *clavirostris*	Tuirial	23.764N92.808E
	171	MF128A	*Garra* cf. *clavirostris*	Tuivai	23.842N93.137E
	172	MF128B	*Garra* cf. *clavirostris*	Tuivai	23.842N93.137E
29	173	MF127D	*Garra* sp. Tuivai 1	Tuivai	23.842N93.137E
	174	MF127G	*Garra* sp. Tuivai 1	Chhirdem	23.791N93.044E
	175	MF127H	*Garra* sp. Tuivai 1	Chhirdem	23.791N93.044E
30	176	MF69C	*Garra* sp. Tuivai 2	Tuila	23.892N93.225E
	177	MF69D	*Garra* sp. Tuivai 2	Tuila	23.892N93.225E
	178	MF69E	*Garra* sp. Tuivai 2	Tuila	23.892N93.225E
	179	MF69F	*Garra* sp. Tuivai 2	Tuila	23.892N93.225E
	180	MF127A	*Garra* sp. Tuivai 2	Tuivai	23.842N93.137E
	181	MF127B	*Garra* sp. Tuivai 2	Tuivai	23.842N93.137E
	182	MF127C	*Garra* sp. Tuivai 2	Tuivai	23.842N93.137E
	183	MF127E	*Garra* sp. Tuivai 2	Tuivai	23.842N93.137E
	184	MF127F	*Garra* sp. Tuivai 2	Tuivai	23.842N93.137E
31	185	MF8M	*Garra* sp. Seling	Seling	23.671N92.374E
	186	MF8N	*Garra* sp. Seling	Seling	23.671N92.374E
32	187	MF8P	*Garra* sp. Phuldungsei	Dampa (P)	23.524N92.379E
33	188	MF9A	*Garra* sp. Tuirial	Tuirial	23.764N92.808E
	189	MF9B	*Garra* sp. Tuirial	Tuirial	23.764N92.808E
	190	MF9C	*Garra* sp. Tuirial	Tuirial	23.764N92.808E
34	191	MF137K	*Garra* sp. Teirei	Teirei via Dampa	23.674N92.454E
	192	MF137L	*Garra* sp. Teirei	Teirei via Dampa	23.674N92.454E
	193	MF137M	*Garra* sp. Teirei	Teirei via Dampa	23.674N92.454E
35	194	MF155A	*Garra* sp. Kaladan	Kaladan	22.461N92.937E
36	195	MF201A	*Laubuka parafasciata*	De	22.951N92.616E
	196	MF201B	*Laubuka parafasciata*	De	22.951N92.616E
	197	MF201C	*Laubuka parafasciata*	Tuipawl Kau	23.027N92.598E
	198	MF201D	*Laubuka parafasciata*	Tuipawl Kau	23.027N92.598E
37	199	MF48F	*Neolissochilus* sp. 1	Seling	23.671N92.374E
	200	MF48G	*Neolissochilus* sp. 1	Seling	23.671N92.374E
	201	MF48H	*Neolissochilus* sp. 1	Seling	23.671N92.374E
	202	MF48I	*Neolissochilus* sp. 1	Seling	23.671N92.374E
	203	MF48J	*Neolissochilus* sp. 1	Seling	23.671N92.374E
	204	MF49I	*Neolissochilus* sp. 1	Mar	23.469N92.451E

	205	MF49J	*Neolissochilus* sp. 1	Mar	23.469N92.451E
	206	MF88A	*Neolissochilus* sp. 1	Tlawng via Sairang	23.808N92.647E
	207	MF88B	*Neolissochilus* sp. 1	Tlawng via Sairang	23.808N92.647E
	208	MF88N	*Neolissochilus* sp. 1	Dampa (P)	23.524N92.380E
	209	MF227A	*Neolissochilus* sp. 1	Tuipawl Kau	23.027N92.598E
38	210	MF88D	*Neolissochilus* sp. 2	Tuivai	23.842N93.137E
	211	MF88G	*Neolissochilus* sp. 2	Tuivai	23.842N93.137E
	212	MF88H	*Neolissochilus* sp. 2	Lungbun	22.461N92.937E
	213	MF88I	*Neolissochilus* sp. 2	Lungbun	22.461N92.937E
	214	MF88J	*Neolissochilus* sp. 2	Lungbun	22.469N93.131E
	215	MF88K	*Neolissochilus* sp. 2	Lungbun	22.469N93.131E
	216	MF88L	*Neolissochilus* sp. 2	Kaladan	22.461N92.937E
	217	MF88M	*Neolissochilus* sp. 2	Kaladan	22.461N92.937E
39	218	MF242A	*Neolissochilus* sp. 3	Kawlchaw	22.413N92.947E
40	219	MF48C	*Neolissochilus* sp. 4	Tuila	23.892N93.225E
	220	MF48D	*Neolissochilus* sp. 4	Tuila	23.892N93.225E
	221	MF49F	*Neolissochilus* sp. 4	Tuila	23.892N93.225E
	222	MF49G	*Neolissochilus* sp. 4	Tuivai	23.842N93.137E
	223	MF49H	*Neolissochilus* sp. 4	Mar	23.469N92.451E
	224	MF88F	*Neolissochilus* sp. 4	Tuivai	23.842N93.137E
	225	MF263A	*Neolissochilus* sp. 4	Tuirial	23.794N92.804E
41	226	MF23D	*Opsarius barna*	Teirei	24.096N92.478E
	227	MF23K	*Opsarius barna*	Teirei via Sihthiang	24.196N92.322E
	228	MF208A	*Opsarius barna*	De	22.951N92.616E
	229	MF208B	*Opsarius barna*	De	22.951N92.616E
	230	MF208F	*Opsarius barna*	Tuipawl Kau	23.027N 92.598E
42	231	MF237A	*Opsarius profundus*	Kawlchaw	22.413N92.947E
	232	MF237B	*Opsarius profundus*	Kawlchaw	22.413N92.947E
	233	MF237C	*Opsarius profundus*	Kawlchaw	22.413N92.947E
	234	MF237D	*Opsarius profundus*	Kawlchaw	22.413N92.947E
	235	MF237G	*Opsarius profundus*	Kawlchaw	22.413N92.947E
43	236	MF63A	*Opsarius tileo*	Teirei	24.156N92.501E
	237	MF63C	*Opsarius tileo*	Teirei	24.156N92.501E
	238	MF63D	*Opsarius tileo*	Tlawng via Sairang	23.810N92.641E
44	239	MF2A	*Pethia conchonius*	Tuirial	23.764N92.808E
	240	MF2B	*Pethia conchonius*	Tuirial	23.764N92.808E
	241	MF254A	*Pethia conchonius*	Tuirial	23.794N92.804E
45	242	MF131A	*Poropuntius* sp.1	Tuivai	23.842N93.137E
46	243	MF48B	*Poropuntius* sp.2	Tuila	23.892N93.225E
47	244	MF19B	*Puntius chola*	Tuirial	23.764N92.808E
	245	MF212B	*Puntius chola*	De	22.951N92.616E
	246	MF212C	*Puntius chola*	De	22.951N92.616E

	247	MF212D	*Puntius chola*	Tuipawl Kau	23.027N92.598E
	248	MF212E	*Puntius chola*	Tuipawl Kau	23.027N92.598E
	249	MF212F	*Puntius chola*	Tuipawl Kau	23.027N92.598E
	250	MF212G	*Puntius chola*	Tuipawl Kau	23.027N92.598E
48	251	MF94A	*Rasbora daniconius*	Langkaih	23.927N92.320E
	252	MF94B	*Rasbora daniconius*	Langkaih	23.927N92.320E
	253	MF204A	*Rasbora daniconius*	De	22.951N92.616E
	254	MF204B	*Rasbora daniconius*	De	22.951N92.616E
	255	MF204C	*Rasbora daniconius*	Tuipawl Kau	23.027N92.598E
	256	MF204D	*Rasbora daniconius*	Tuipawl Kau	23.027N92.598E
	257	MF204E	*Rasbora daniconius*	Tuipawl Kau	23.027N92.598E
	258	MF204F	*Rasbora daniconius*	Tuipawl Kau	23.027N92.598E
49	259	MF150A	*Salmostoma* sp. 1	Kaladan	22.447N92.936E
	260	MF150B	*Salmostoma* sp. 1	Kaladan	22.447N92.936E
	261	MF150C	*Salmostoma* sp. 1	Kaladan	22.447N92.936E
	262	MF150D	*Salmostoma* sp. 1	Kaladan	22.447N92.936E
	263	MF203A	*Salmostoma* sp. 1	De	22.951N92.616E
50	264	MF86A	*Salmostoma* sp. 2	Tlawng via Sairang	23.808N92.647E
	265	MF86B	*Salmostoma* sp. 2	Tlawng via Sairang	23.808N92.647E
	266	MF86C	*Salmostoma* sp. 2	Tlawng via Sairang	23.808N92.647E
	267	MF86D	*Salmostoma* sp. 2	Tlawng via Sairang	23.808N92.647E
51	268	MF78A	*Semiplotus modestus*	Ngengpui	22.526N92.773E
	269	MF78B	*Semiplotus modestus*	Lungbun	22.469N93.131E
	270	MF78C	*Semiplotus modestus*	Lungbun	22.469N93.131E
	271	MF78F	*Semiplotus modestus*	Tuisi	23.182N93.043E
	272	MF78H	*Semiplotus modestus*	Tuisi	23.182N93.043E
	273	MF78G	*Semiplotus modestus*	Tuisi	23.182N93.043E
	274	MF78L	*Semiplotus modestus*	Tiau	23.073N93.339E
	275	MF236A	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	276	MF236B	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	277	MF236C	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	278	MF236D	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	279	MF236E	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	280	MF236F	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	281	MF236G	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
	282	MF236H	*Semiplotus modestus*	Kawlchaw	22.413N92.947E
52	283	MF30A	*Tariqilabeo latius*	Teirei	24.096N92.478E
	284	MF30B	*Tariqilabeo latius*	Teirei	24.096N92.478E
	285	MF30C	*Tariqilabeo latius*	Langkaih	23.927N92.320E
	286	MF30D	*Tariqilabeo latius*	Langkaih	23.927N92.320E
	287	MF30E	*Tariqilabeo latius*	Langkaih	23.927N92.320E
	288	MF30F	*Tariqilabeo latius*	Langkaih	23.927N92.320E

	289	MF30G	*Tariqilabeo latius*	Langkaih	23.927N92.320E
53	290	MF154A	*Tariqilabeo* sp.	Kaladan	22.461N92.937E
	291	MF154B	*Tariqilabeo* sp.	Kaladan	22.461N92.937E
	292	MF154C	*Tariqilabeo* sp.	Kaladan	22.461N92.937E
	293	MF154D	*Tariqilabeo* sp.	Kaladan	22.461N92.937E
54	294	MF49E	*Tor barakae*	Tuila	23.892N93.225E
	295	MF88C	*Tor barakae*	Tuivai	23.842N93.137E
	296	MF88E	*Tor barakae*	Tuivai	23.842N93.137E
55	297	MF32C	*Neonoemacheilus assamensis*	Langkaih	23.927N92.320E
	298	MF32D	*Neonoemacheilus assamensis*	Langkaih	23.927N92.320E
	299	MF32E	*Neonoemacheilus assamensis*	Langkaih	23.927N92.320E
56	300	MF20A	*Paracanthocobitis* sp.	Tuirial	23.764N92.808E
	301	MF20E	*Paracanthocobitis* sp.	Teirei	23.764N92.808E
	302	MF202D	*Paracanthocobitis* sp.	De	22.951N92.616E
	303	MF202E	*Paracanthocobitis* sp.	De	22.951N92.616E
	304	MF202F	*Paracanthocobitis* sp.	De	22.951N92.616E
	305	MF202G	*Paracanthocobitis* sp.	De	22.951N92.616E
	306	MF202H	*Paracanthocobitis* sp.	Tuipawl Kau	23.027N92.598E
57	307	MF248A	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	308	MF248B	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	309	MF248C	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	310	MF248D	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	311	MF248E	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	312	MF248G	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
	313	MF248H	*Physoschistura tuivaiensis*	Tuirial	23.794N92.804E
58	314	MF166A	*Physoschistura chhimtuipuiensis*	Tuisi	23.182N93.043E
	315	MF166B	*Physoschistura chhimtuipuiensis*	Tuisi	23.182N93.043E
59	316	MF216A	*Physoschistura* sp	De	22.951N92.616E
	317	MF216B	*Physoschistura* sp	De	22.951N92.616E
	318	MF216C	*Physoschistura* sp	De	22.951N92.616E
	319	MF216D	*Physoschistura* sp	De	22.951N92.616E
60	320	MF13A	*Schistura aizawlensis*	Tuirial	23.764N92.808E
	321	MF13E	*Schistura aizawlensis*	Tuirial	23.764N92.808E
61	322	MF3A	*Schistura fasciata*	Tuirial	23.764N92.808E
	323	MF3C	*Schistura fasciata*	Tuirial	23.764N92.808E
	324	MF3D	*Schistura fasciata*	Tuirial	23.764N92.808E
	325	MF3E	*Schistura fasciata*	Tuirial	23.764N92.808E
	326	MF3I	*Schistura fasciata*	Tuivai	23.842N93.137E
	327	MF3K	*Schistura fasciata*	Tuivai	23.842N93.137E
	328	MF3L	*Schistura fasciata*	Tuivai	23.842N93.137E
	329	MF3M	*Schistura fasciata*	Tuivai	23.842N93.137E
	330	MF3N	*Schistura fasciata*	Tuivai	23.842N93.137E

	331	MF3O	*Schistura fasciata*	Tuivai	23.842N93.137E
62	332	MF213A	*Schistura* cf. *fasciata*	De	22.951N92.616E
	333	MF213C	*Schistura* cf. *fasciata*	De	22.951N92.616E
	334	MF213D	*Schistura* cf. *fasciata*	De	22.951N92.616E
	335	MF213E	*Schistura* cf. *fasciata*	De	22.951N92.616E
	336	MF213F	*Schistura* cf. *fasciata*	De	22.951N92.616E
	337	MF213G	*Schistura* cf. *fasciata*	De	22.951N92.616E
	338	MF232A	*Schistura* cf. *fasciata*	Tuipawl Kau	23.027N92.598E
	339	MF232B	*Schistura* cf. *fasciata*	Tuipawl Kau	23.027N92.598E
	340	MF232C	*Schistura* cf. *fasciata*	Tuipawl Kau	23.027N92.598E
	341	MF55A	*Schistura* cf. *fasciata*	Aivapui	23.474N92.392E
	342	MF55B	*Schistura* cf. *fasciata*	Aivapui	23.474N92.392E
63	343	MF136A	*Schistura koladynensis*	Lungbun	22.469N93.131E
	344	MF136B	*Schistura koladynensis*	Lungbun	22.469N93.131E
	345	MF136C	*Schistura koladynensis*	Kaladan	22.461N92.937E
	346	MF136D	*Schistura koladynensis*	Kaladan	22.461N92.937E
	347	MF136E	*Schistura koladynensis*	Kaladan	22.461N92.937E
	348	MF136G	*Schistura koladynensis*	Kaladan	22.461N92.937E
64	349	MF40C	*SchisturaNebeshwari*	Kaladan	22.461N92.937E
	350	MF40D	*SchisturaNebeshwari*	Kaladan	22.461N92.937E
	351	MF40F	*SchisturaNebeshwari*	Kaladan	22.461N92.937E
	352	MF40G	*SchisturaNebeshwari*	Kaladan	22.461N92.937E
65	353	MF1B	*Schistura paucireticulata*	Tuirial	23.764N92.808E
	354	MF1C	*Schistura paucireticulata*	Tuirial	23.764N92.808E
	355	MF1D	*Schistura paucireticulata*	Tuirial	23.764N92.808E
	356	MF1E	*Schistura paucireticulata*	Tuirial	23.764N92.808E
	357	MF1G	*Schistura paucireticulata*	Teirei	24.096N92.478E
66	358	MF217A	*Schistura* cf. *paucireticulata*	De	22.951N92.616E
	359	MF217B	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	360	MF217C	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	361	MF217D	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	362	MF217E	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	363	MF217F	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	364	MF217G	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
	365	MF217H	*Schistura* cf. *paucireticulata*	Tuipawl Kau	23.027N92.598E
67	366	MF151A	*Schistura scyphovecteta*	Kaladan	22.461N92.937E
	367	MF151B	*Schistura scyphovecteta*	Kaladan	22.461N92.937E
68	368	MF71A	*Psilorhynchus* cf. *homaloptera*	Tuila	23.892N93.225E
	369	MF71C	*Psilorhynchus* cf. *homaloptera*	Tuila	23.892N93.225E
69	370	MF141A	*Psylorynchus* cf. *khopai*	Tiau	23.073N93.339E
70	371	MF138A	*Psylorynchus rahmani*	Seling	23.671N92.374E
	372	MF138B	*Psylorynchus rahmani*	Seling	23.671N92.374E

	373	MF161A	*Psylorynchus rahmani*	Mar	23.480N92.450E
	374	MF161B	*Psylorynchus rahmani*	Mar	23.480N92.450E
	375	MF161C	*Psylorynchus rahmani*	Mar	23.480N92.450E
	376	MF161D	*Psylorynchus rahmani*	Mar	23.480N92.450E
	377	MF161F	*Psylorynchus rahmani*	Mar	23.480N92.450E
	378	MF219A	*Psylorynchus rahmani*	De	22.951N92.616E
	379	MF219B	*Psylorynchus rahmani*	Tuipawl Kau	23.027N92.598E
	380	MF219C	*Psylorynchus rahmani*	Tuipawl Kau	23.027N92.598E
71	381	MF96A	*Psilorhynchus sucatio*	Langkaih	23.927N92.320E
	382	MF96B	*Psilorhynchus sucatio*	Langkaih	23.927N92.320E
	383	MF96C	*Psilorhynchus sucatio*	Langkaih	23.927N92.320E
72	384	MF4A	*Psilorhynchus nudithoracicus*	Tuirial	23.764N92.808E
	385	MF4B	*Psilorhynchus nudithoracicus*	Tuirial	23.764N92.808E
	386	MF4C	*Psilorhynchus nudithoracicus*	Tuirial	23.764N92.808E
	387	MF4D	*Psilorhynchus nudithoracicus*	Tuirial	23.764N92.808E
	388	MF4E	*Psilorhynchus nudithoracicus*	Teirei	24.096N92.478E
	389	MF4F	*Psilorhynchus nudithoracicus*	Teirei	24.096N92.478E
	390	MF4G	*Psilorhynchus nudithoracicus*	Teirei	24.096N92.478E
	391	MF4H	*Psilorhynchus nudithoracicus*	Teirei	24.096N92.478E
73	392	MF7A	*Badis* cf. *chittagongis*	Tuirial	23.764N92.808E
	393	MF7B	*Badis* cf. *chittagongis*	Tuirial	23.764N92.808E
	394	MF7C	*Badis* cf. *chittagongis*	Tuirial	23.764N92.808E
	395	MF7D	*Badis* cf. *chittagongis*	Tlawng	24.139N92.545E
	396	MF7E	*Badis* cf. *chittagongis*	Tlawng	24.139N92.545E
	397	MF7F	*Badis* cf. *chittagongis*	Tlawng	24.139N92.545E
	398	MF7P	*Badis* cf. *chittagongis*	Teirei via Sihthiang	24.196N92.322E
	399	MF7Q	*Badis* cf. *chittagongis*	Teirei via Sihthiang	24.196N92.322E
	400	MF139A	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	401	MF139B	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	402	MF139C	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	403	MF139D	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	404	MF139E	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	405	MF139F	*Badis* cf. *chittagongis*	Seling	23.671N92.374E
	406	MF139H	*Badis* cf. *chittagongis*	Mar	23.469N92.451E
	407	MF139I	*Badis* cf. *chittagongis*	Mar	23.469N92.451E
	408	MF139J	*Badis* cf. *chittagongis*	Mar	23.469N92.451E
	409	MF139L	*Badis* cf. *chittagongis*	Mar	23.469N92.451E
	410	MF139M	*Badis* cf. *chittagongis*	Mar	23.469N92.451E
	411	MF229A	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	412	MF229B	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	413	MF229C	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	414	MF229D	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E

	415	MF229E	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	416	MF229F	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	417	MF229G	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	418	MF229H	*Badis* cf. *chittagongis*	Tuipawl Kau	23.027N 92.598E
	419	MF249A	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
	420	MF249B	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
	421	MF249C	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
	422	MF249D	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
	423	MF249E	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
	424	MF249F	*Badis* cf. *chittagongis*	Tuirial	23.794N92.804E
74	425	MF73A	*Badis* cf. *tuivaiei*	Tuila	23.892N93.225E
	426	MF73B	*Badis* cf. *tuivaiei*	Tuila	23.892N93.225E
	427	MF73E	*Badis* cf. *tuivaiei*	Tuila	23.892N93.225E
75	428	MF83A	*Parambasis serrata*	Tuichang	23.470N93.081E
76	429	MF95A	*Parambasis* sp.	Langkaih	23.927N92.320E
	430	MF95C	*Parambasis* sp.	Langkaih	23.927N92.320E
77	431	MF163A	*Channa aurantipectoralis*	Dampa (P)	23.524N92.380E
	432	MF163B	*Channa aurantipectoralis*	Dampa (P)	23.524N92.380E
	433	MF163C	*Channa aurantipectoralis*	Dampa (P)	23.524N92.380E
	434	MF163D	*Channa aurantipectoralis*	Dampa (P)	23.524N92.380E
	435	MF163E	*Channa aurantipectoralis*	Dampa (P)	23.524N92.380E
78	436	MF170A	*Channa stiktos*	Tiau	23.074N93.339E
	437	MF170B	*Channa stiktos*	Tiau	23.074N93.339E
79	438	MF33A	*Channa* cf. *gachua*	Tlawng	24.139N92.545E
80	439	MF26A	*Channa punctata*	Teirei	24.096N92.478E
81	440	MF169A	*Channa* sp. Spotted Kaladan	Kaladan	22.461N92.937E
	441	MF169B	*Channa* sp. Spotted Kaladan	Kaladan	22.461N92.937E
82	442	MF225A	*Channa* sp. Tuipawl	Tuipawl Kau	23.027N92.598E
	443	MF225B	*Channa* sp. Tuipawl	Tuipawl Kau	23.027N92.598E
83	444	MF162A	Channa sp. Kaladan	Kaladan	22.461N92.937E
	445	MF162B	Channa sp. Kaladan	Kaladan	22.461N92.937E
	446	MF162C	Channa sp. Kaladan	Kaladan	22.461N92.937E
84	447	MF33B	Channa sp. Tlawng	Tlawng	24.139N92.545E
	448	MF33C	Channa sp. Tlawng	Tlawng	24.139N92.545E
	449	MF259A	Channa sp. Tlawng	Tuirial	23.794N92.804E
85	450	MF153A	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	451	MF153B	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	452	MF153C	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	453	MF153D	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	454	MF153E	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	455	MF153G	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E
	456	MF153H	*Awaous* cf. *gutum*	Kaladan	22.461N92.937E

	457	MF241A	*Awaous* cf. *gutum*	Kawlchaw	22.413N92.947E
86	458	MF21D	*Glossogobius giuris*	Teirei	24.096N92.478E
	459	MF21E	*Glossogobius giuris*	Teirei	24.096N92.478E
	460	MF21F	*Glossogobius giuris*	Teirei	24.096N92.478E
	461	MF21G	*Glossogobius giuris*	Teirei	24.096N92.478E
	462	MF21H	*Glossogobius giuris*	Teirei via Sihthiang	24.196N92.322E
	463	MF220A	*Glossogobius giuris*	De	22.951N92.616E
	464	MF220B	*Glossogobius giuris*	Tuipawl Kau	23.027N92.598E
87	465	MF62E	*Amblyceps arunachalensis*	Tlawng	24.139N92.545E
	466	MF62F	*Amblyceps arunachalensis*	Tlawng via Sairang	23.808N92.647E
	467	MF62G	*Amblyceps arunachalensis*	Tlawng via Sairang	23.808N92.647E
	468	MF62H	*Amblyceps arunachalensis*	Tlawng via Sairang	23.808N92.647E
	469	MF253A	*Amblyceps arunachalensis*	Tuirial	23.794N92.804E
88	470	MF62A	*Amblyceps mangois*	Teirei via Sihthiang	24.196N92.322E
	471	MF62B	*Amblyceps mangois*	Tuirial	23.764N92.808E
	472	MF62C	*Amblyceps mangois*	Tuirial	23.764N92.808E
	473	MF62D	*Amblyceps mangois*	Tuirial	23.764N92.808E
	474	MF210A	*Amblyceps mangois*	De	22.951N92.616E
	475	MF210B	*Amblyceps mangois*	De	22.951N92.616E
	476	MF210C	*Amblyceps mangois*	De	22.951N92.616E
	477	MF231E	*Amblyceps mangois*	Tuipawl Kau	23.027N92.598E
	478	MF231F	*Amblyceps mangois*	Tuipawl Kau	23.027N92.598E
	479	MF253B	*Amblyceps mangois*	Tuirial	23.794N92.804E
	480	MF253C	*Amblyceps mangois*	Tuirial	23.794N92.804E
	481	MF253D	*Amblyceps mangois*	Tuirial	23.794N92.804E
	482	MF253E	*Amblyceps mangois*	Tuirial	23.794N92.804E
	483	MF253F	*Amblyceps mangois*	Tuirial	23.794N92.804E
89	484	MF152A	*Amblycep* sp.	Kaladan	22.461N92.937E
	485	MF152B	*Amblycep* sp.	Kaladan	22.461N92.937E
	486	MF152C	*Amblycep* sp.	Kaladan	22.461N92.937E
90	487	MF41D	*Batasio convexirostrum*	Tuichang	23.470N93.081E
	488	MF41G	*Batasio convexirostrum*	Tuichang	23.470N93.081E
	489	MF41H	*Batasio convexirostrum*	Kaladan	22.461N92.937E
91	490	MF209D	*Batasio* sp.	Tuipawl Kau	23.027N92.598E
	491	MF209E	*Batasio* sp.	Tuipawl Kau	23.027N92.598E
92	492	MF64A	*Mystus bleekeri*	Teirei via Sihthiang	24.196N92.322E
	493	MF64B	*Mystus bleekeri*	Sihthiang	24.067N92.448E
	494	MF218A	*Mystus bleekeri*	De	22.951N92.616E
	495	MF218B	*Mystus bleekeri*	Tuipawl Kau	23.027N92.598E
	496	MF218D	*Mystus bleekeri*	Tuipawl Kau	23.027N92.598E
	497	MF218E	*Mystus bleekeri*	Tuipawl Kau	23.027N92.598E
	498	MF218F	*Mystus bleekeri*	Tuipawl Kau	23.027N92.598E

	499	MF218G	*Mystus bleekeri*	Tuipawl Kau	23.027N92.598E
93	500	MF143A	*Olyra saginata*	Kaladan	22.461N92.937E
	501	MF143B	*Olyra saginata*	Kaladan	22.461N92.937E
	502	MF143C	*Olyra saginata*	Kaladan	22.461N92.937E
94	503	MF25A	*Olyra* cf. *praestigiosa*	Teirei	24.096N92.478E
	504	MF25B	*Olyra* cf. *praestigiosa*	Teirei	24.096N92.478E
	505	MF25C	*Olyra* cf. *praestigiosa*	Teirei	24.096N92.478E
	506	MF231B	*Olyra* cf. *praestigiosa*	Tuipawl Kau	23.027N92.598E
	507	MF231C	*Olyra* cf. *praestigiosa*	Tuipawl Kau	23.027N92.598E
	508	MF255A	*Olyra* cf. *praestigiosa*	Tuirial	23.794N92.804E
	509	MF255B	*Olyra* cf. *praestigiosa*	Tuirial	23.794N92.804E
95	510	MF146A	*Sperata* sp.	Kaladan	22.461N92.937E
	511	MF146B	*Sperata* sp.	Kaladan	22.461N92.937E
96	512	MF91A	*Clarias magur*	Langkaih	23.927N92.320E
	513	MF91B	*Clarias magur*	Langkaih	23.927N92.320E
	514	MF226A	*Clarias magur*	Tuipawl Kau	23.027N92.598E
97	515	MF222B	*Heteropneustes* sp. 1	Tuipawl Kau	23.027N92.598E
	516	MF222C	*Heteropneustes* sp. 1	Tuipawl Kau	23.027N92.598E
	517	MF92A	*Heteropneustes* sp. 1	Langkaih	23.927N92.320E
	518	MF92C	*Heteropneustes* sp. 1	Langkaih	23.927N92.320E
98	519	MF222A	*Heteropneustes* sp. 2	Tuipawl Kau	23.027N92.598E
	520	MF222D	*Heteropneustes* sp. 2	Tuipawl Kau	23.027N92.598E
99	521	MF57C	*Pterocryptis* sp.	Ngengpui	22.526N92.773E
	522	MF57D	*Pterocryptis* sp.	Ngengpui	22.526N92.773E
	523	MF142A	*Pterocryptis* sp.	Kaladan	22.461N92.937E
	524	MF142B	*Pterocryptis* sp.	Kaladan	22.461N92.937E
	525	MF57B	*Pterocryptis* sp.	Aivapui	23.474N92.392E
	526	MF142C	*Pterocryptis* sp.	Mar	23.469N92.451E
	527	MF142D	*Pterocryptis* sp.	Dampa(P)	23.524N92.379E
	528	MF142E	*Pterocryptis* sp.	Dampa(P)	23.524N92.379E
100	529	MF147A	*Bagarius* sp.	Kaladan	22.461N92.937E
101	530	MF61A	*Gogangra viridescens*	Teirei via Sihthiang	24.196N92.322E
	531	MF61B	*Gogangra viridescens*	Teirei via Sihthiang	24.196N92.322E
	532	MF61C	*Gogangra viridescens*	Langkaih	23.927N92.320E
102	533	MF243C	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
	534	MF243D	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
	535	MF243E	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
	536	MF243F	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
	537	MF243G	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
	538	MF243H	*Glyptothorax* cf. *ater*	Kawlchaw	22.413N92.947E
103	539	MF134A	*G. chimtuipuiensis*	Lungbun	22.469N93.131E
	540	MF134B	*G. chimtuipuiensis*	Lungbun	22.469N93.131E

	541	MF134C	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
	542	MF134D	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
	543	MF134E	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
	544	MF134G	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
	545	MF134H	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
	546	MF134I	*G. chimtuipuiensis*	Tuisi	23.182N93.043E
104	547	MF158 A	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	548	MF158 B	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	549	MF158 C	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	550	MF158 D	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	551	MF158E	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	552	MF158 F	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	553	MF158 G	*Glyptothorax churamanii*	Kaladan	22.461N92.937E
	554	MF167A	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	555	MF167B	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	556	MF167C	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	557	MF167D	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	558	MF168A	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	559	MF168B	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	560	MF168C	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	561	MF168D	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	562	MF168E	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	563	MF168F	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	564	MF168G	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	565	MF168I	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
	566	MF168J	*Glyptothorax churamanii*	Tuisi	23.182N93.043E
105	567	MF85A	*Glyptothorax* cf. *dikrongensis*	Tlawng via Sairang	23.808N92.647E
	568	MF85B	*Glyptothorax* cf. *dikrongensis*	Tlawng via Sairang	23.808N92.647E
106	569	MF133B	*Glyptothorax jayarami*	Tuisi	23.182N93.043E
	570	MF133C	*Glyptothorax jayarami*	Tuisi	23.182N93.043E
107	571	MF15A	*Glyptothorax maceriatus*	Tuirial	23.764N92.808E
	572	MF15M	*Glyptothorax maceriatus*	Tuivai	23.842N93.137E
	573	MF15O	*Glyptothorax maceriatus*	Tuivai	23.842N93.137E
	574	MF15P	*Glyptothorax maceriatus*	Tuivai	23.842N93.137E
	575	MF205A	*Glyptothorax maceriatus*	De	22.951N92.616E
	576	MF205B	*Glyptothorax maceriatus*	De	22.951N92.616E
	577	MF205C	*Glyptothorax maceriatus*	De	22.951N92.616E
	578	MF205D	*Glyptothorax maceriatus*	De	22.951N92.616E
	579	MF205E	*Glyptothorax maceriatus*	De	22.951N92.616E
108	580	MF101A	*Glyptothorax manipurensis*	Chhirdem	23.791N93.044E
109	581	MF36A	*Glyptothorax telchitta*	Tlawng	24.139N92.545E

	582	MF36B	*Glyptothorax telchitta*	Tlawng	24.139N92.545E
	583	MF36C	*Glyptothorax telchitta*	Teirei via Sihthiang	24.196N92.322E
	584	MF36D	*Glyptothorax telchitta*	Tlawng via Sairang	23.808N92.647E
110	585	MF81B	*Glyptothorax verrucosus*	Tuichang	23.470N93.081E
	586	MF81C	*Glyptothorax verrucosus*	Tuichang	23.470N93.081E
	587	MF81D	*Glyptothorax verrucosus*	Tuichang	23.470N93.081E
111	588	MF28A	*Glyptothorax sp.* Teirei	Teirei	24.096N92.478E
	589	MF28B	*Glyptothorax sp.* Teirei	Teirei	24.096N92.478E
	590	MF28E	*Glyptothorax sp.* Teirei	Teirei	24.096N92.478E
112	591	MF84A	*Glyptothorax sp.* Tlawng	Tlawng via Sairang	23.808N92.647E
	592	MF84B	*Glyptothorax sp.* Tlawng	Tlawng via Sairang	23.808N92.647E
	593	MF84C	*Glyptothorax sp.* Tlawng	Tlawng via Sairang	23.808N92.647E
113	594	MF54B	*Glyptothorax* sp.	Aivapui	23.474N92.392E
	595	MF54C	*Glyptothorax* sp.	Aivapui	23.474N92.392E
	596	MF54E	*Glyptothorax* sp.	Mar	23.469N92.451E
	597	MF54F	*Glyptothorax* sp.	Dampa(P)	23.524N92.379E
	598	MF54G	*Glyptothorax* sp.	Dampa(P)	23.524N92.379E
	599	MF54H	*Glyptothorax* sp.	Dampa(P)	23.524N92.379E
	600	MF54I	*Glyptothorax* sp.	Dampa(P)	23.524N92.379E
	601	MF54J	*Glyptothorax* sp.	Dampa(P)	23.524N92.379E
114	602	MF60A	*Hara hara*	Teirei via Sihthiang	24.196N92.322E
115	603	MF82A	*Pseudocheneis koladynae*	Tuichang	23.470N93.081E
	604	MF82C	*Pseudocheneis koladynae*	Tuichang	23.470N93.081E
	605	MF82E	*Pseudocheneis koladynae*	Lungbun	22.469N93.131E
	606	MF82F	*Pseudocheneis koladynae*	Kaladan	22.461N92.937E
	607	MF82G	*Pseudocheneis koladynae*	Tuisi	23.182N93.043E
	608	MF82H	*Pseudocheneis koladynae*	Tuisi	23.182N93.043E
116	609	MF10B	*Pseudolaguvia spicula*	Tuirial	23.764N92.808E
	610	MF10D	*Pseudolaguvia spicula*	Tuirial	23.764N92.808E
	611	MF10F	*Pseudolaguvia spicula*	Teirei	24.096N92.478E
	612	MF10J	*Pseudolaguvia spicula*	Teirei	24.096N92.478E
	613	MF261A	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	614	MF261B	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	615	MF261C	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	616	MF261D	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	617	MF261E	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	618	MF261F	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	619	MF261G	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
	620	MF261H	*Pseudolaguvia spicula*	Tuirial	23.794N92.804E
117	621	MF262A	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
	622	MF262B	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
	623	MF262C	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E

	624	MF262D	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
	625	MF262E	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
	626	MF262F	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
	627	MF262H	*Pseudolaguvia virgulata*	Tuirial	23.794N92.804E
118	628	MF10G	*Pseudolaguvia* sp.	Teirei	24.096N92.478E
	629	MF10I	*Pseudolaguvia* sp.	Teirei	24.096N92.478E
	630	MF10K	*Pseudolaguvia* sp.	Teirei	24.096N92.478E
119	631	MF98A	*Sisor* sp.	Langkaih	23.927N92.320E
120	632	MF16D	*Mastacembelus armatus*	Tuivai	23.842N93.137E
	633	MF16E	*Mastacembelus armatus*	Chhirdem	23.791N93.044E
	634	MF16F	*Mastacembelus armatus*	Tuivai	23.842N93.137E
	635	MF16G	*Mastacembelus armatus*	Tuivai	23.842N93.137E
	636	MF16H	*Mastacembelus armatus*	Lungbun	22.469N93.131E

INSTITUTION VISIT:

PI from Northeast visits the Zoological Survey of India (ZSI) Museum, Kolkata; Zoological Survey of India (ZSI) Museum, Shillong, Meghalaya for comparision and identification of specimens collected.

B2. Summary and Conclusions of the Progress made so far
(minimum 100 words, maximum 200 words)

The research project covers the three drainages in Mizoram viz the Barak, the Kaladan and the Karnaphuli River drainage of where 79 sites from 27 major tributaries were surveyed. Each site had been visited once each. Fishes were collected using cast net, drag net and other local catching methods. Fishes were identified following relevant literature and physical comparisons with type and non-type specimens from reputed museums. Altogether 120 different species comprising of 636 specimens were collected under 5 orders and 16 families. The order Cypriniformes (55.83 %) dominated the composition followed by Siluriformes (27.5 %), Perciformes (11.67 %), Beloniformes (1.67 %) and Synbranchiformes (0.83 %). DNA Extraction was completed for all the tissues collected. PCR amplification and DNA sequencing completed for 679 samples of 76 species for Cytochrome oxidase I and 597 samples of 73 species for cytchrome b gene. Phylogenetic analysis was done for eight genera namely *Barilius, Tarigilabeo, Glyptothorax, Garra, Pethia, Pseudolaguvia, Psilorhynchus,* and *Schistura*. The study resulted in the first report of the genus *Neonoemacheilus*, particularly *N.assamensis*, from Mizoram (**Science Vision**15 (3): 145-151). During the study, a new species of fish, *Laubukaparafasciata,* (**Zootaxa**, 4244(2):269-276), *Neolissochilus kaladanensis* **(Mit. DNA A** doi: 10.1080/24701394.2018.1450398) and *Channa stiktos* (**Vertebrate Zoology**, 68 (2): 165 – 175) are described in SCI index journal. Both the PIs exchanged institutional visits for training and setting up of laboratory respectively.

B3. Details of New Leads Obtained, if any:

New species never known to science were discovered and published in reputed journals, and more are yet to come. More than three species complexes are being analyzed.

B4. Details of Publications & Patents, if any:

1. Vanlalhlimpuia, D., Shukla, R., Singh, M., & Lalramliana (2015). First report of the genus *Neonoemacheilus* Zhu &Guo (Cobitidae: Nemacheilidae) from rivers of Mizoram, northeastern India with a note on *N. assamensis* Menon. **Science Vision**, 15,145-155.
2. Lalramliana, Vanlalhlimpuia, D., & Singh, M. (2017) *Laubuka parafasciata*, a new cyprinid fish species (Teleostei: Cyprinidae) from Mizoram northeastern India. **Zootaxa**, 4244 (2), 269-276.
3. Lalramliana, Lalronunga S, Kumar S & Singh M (2018) DNA barcoding revealed a new species of *Neolissochilus*Rainboth, 1985 from the KaladanRiver of Mizoram, North East India. **Mitochondrial DNA Part A.** (online first) DOI: 10.1080/24701394.2018.1450398
4. Lalramliana, Knight JDM, Lalhlimpuia DV & Singh M (2018). Integrative taxonomy reveals a new species of snakehead fish, *Channa stiktos* (Teleostei: Channidae), from Mizoram, North Eastern India. Vertebrate Zoology, 68 (2): 165 –175. [Impact Factor = 0.98]

Paper in Proceedings

1. Lalhlimpuia DV, Lalramliana & Singh M (2016). Status of freshwater fishes of Mizoram. Proceedings In: Science and technology for shaping the future of Mizoram. Chapter 5, 21–28pp. [ISBN: 978-93-85926-49-5]
2. Lalhlimpuia DV, Lalramliana & Singh M (2018). Distribution, diversity and interrelationship of the genus *Channa* (Teleostei: Channidae) in different drainage systems of Mizoram, Northeast India. Proceedings In: Biodiversity Conservation: Strategies and Applications, 2018, Chapter-5: 57-74. [ISBN No.: 978-81-937-3274-8]

MS under preparation

1. Morphological and molecular characterization reveals a new species of fish *Cabdio crassus* (Cypriniformes: Cyprinidae) from the Kaladan basin of Mizoram, India
2. *Amblyceps hmolai,* a new species of torrent catfish from the Kaladan River of Mizoram, India based on morpholocial and molecular data
3. DNA barcoding reveals a new species of *Glyptothorax* (Actinopterygii: Siluriformes) from Mizoram, northeast India

Images of firstreport and new species discovered from Mizoram under the funded Project

A. First Report from Mizoram

Fig 4: ***Neonoemacheilus assamensis*** (**Science Vision2015**, 15 (3): 145-151)

B. New Species Discovered

Fig 5: ***Laubuka parafasciata*** (**Zootaxa 2017**, 4244(2):269-276)

Fig 6: ***Neolissochilus kaladanensis*** **(Mit. DNA A 2018,** doi: 10.1080/24701394.2018.1450398**)**

Fig 7: ***Channa stiktos*** **(Vertebrate Zoology 2018**, 68 (2): 165 –175)

Section-C: Details of Grant Utilization#

(11th Dec., 2014 – 30th Jun., 2018)

C1. Equipment Acquired or Placed Order with Actual Cost:

1. Pachhunga University College, Aizawl, Mizoram

Sl. No.	Name of equipment	Quantity	Sanctioned Cost (Rupees in lakhs)	Actual Purchased cost (Rupees in lakhs)	Purchase details
1	Olympus Stereo Zoom microscope	**1**	**5.0**	**5.12**	The sanctioned model is SZX 16 however the cost is too high therefore SZX 10 is purchased
2	Nikon D7000 DSLR Camera	**1**	**0.8**	**0.75**	Nikkor 40 mm F/2.8 macro lens is purchased along with the camera
3	Fish sample transport box	**4**	**0.5**	**0.48**	Rate = Rs. 0.12 lakh/box
4	Deep freezer	**1**	**0.4**	**0.35**	
TOTAL			**6.7**	**6.7**	

2. NBFGR, Lucknow

Sl. No.	Name of equipment	Quantity	Sanctioned Cost (Rupees)	Actual Purchased cost (Rupees)	Purchase details
1	Small centrifuge	1	50,000	49,995	Received on 25.03.2016
2	Accessories of electrophoresis	-	1,00,000	94,018	Received on 28.03.2016
TOTAL			**1,50,000**	**1,44,013**	

C2. Man power Staffing and Expenditure Details (11th Dec to Jun 2018)

1. Pachhunga University College, Aizawl, Mizoram

Sanctioned Post	**Number**	**Scale of Pay (Rupees)**	**Actual Release by DBT (Rupees)**	**Actual Expenditure (Rupees)**	**Balance (Rupees)**
JRF	1	**12000 + 10% HRA/pm** (Feb. 2015-Dec. 2016) &**14000 + 10% HRA/pm** (Jan. 2017-Jun. 2018)	598000	580800	17200
Lab. Attendant	1	5000 (fixed)pm	180000	205000	(-) 25000
Total	2		778000	785800	(-) 7800

2. NBFGR, Lucknow

Sanctioned Post	**Number**	**Scale of Pay (Rupees)**	**Actual Release by DBT (Rupees)**	**Actual Expenditure (Rupees)**	**Balance (Rupees)**
JRF	1	12000 or 25000 + 20% HRA	8,01,000	7,36,924	64,076

C3. Details of Recurring Expenditure:

1. Pachhunga University College, Aizawl, Mizoram (in lakhs)

Item	**Grants received from DBT during the year**	**Expenditure (excluding) commitments) incurred during the year**	**Balance**	**Remark**
Human Resource	**7.78**	**7.858**	**(-) 0.078**	
Consumables	**8.6**	**8.6**	**0**	
Travel	**3.0**	**3.0**	**0**	
Contingency	**3.0**	**3.0**	**0**	
Overheads	**0.90** **(0.88 + 0.02 as interest)**	**0.90**	**0**	
TOTAL	**27.88**	**27.958**	**(-) 0.078**	

2. NBFGR, Lucknow (Rupees)

Item	**Grants received from DBT during the period**	**Expenditure (excluding) commitments) incurred during the period**	**Balance**	**Remark**
Human Resource	8,01,000	7,36,924	64,076	
Consumables	11,86,000	10,81,196	1,04,804	
Travel	51,000	20,911	30,089	
Contingency	58,000	56,814	1,186	
Overheads	52,000	52,000	-	
TOTAL	**22,98,000**	**20,91,858**	**2,06,142**	Balance of Rs. **2,06,142** will be refunded to DBT

#Grant utilization details (UC&SE, Assets Certificate & manpower details) also required to be submitted separately as per the prescribed format

(MAHENDER SINGH) **(LALRAMLIANA)**

PROJECT INVESTIGATORS

Instructions:

(i) *All the information needs to be provided, otherwise the Progress Report will be treated as incomplete. In case of 'Nil' / 'Not Applicable' information, the same may be indicated.*

(ii) *In case of multicentric project, a combined Progress Report should be submitted incorporating the progress of all components. The Project Co-coordinator/ PI will be responsible for this.*

(iii) **Please indicate the reporting period [i.e.Year 1/2/3/4/5].*

(iv) *Submission of Progress Report by the end of the 11th month of grant sanction is linked with further continuation of the project and timely release of funds for the next year.*