

2011 Mongolian Expedition - FISHERIES
Executive Summary

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This report pertains to 2011 ichthyological activities relevant to project entitled Collaborative Research: Intracontinental Deformation and Surface Uplift: Geodynamic Evolution of the Hangay Dome, Mongolia, Central Asia. Project funded by NSF Division of Earth Sciences, Continental Dynamics Program, Award Number 1009702, to Karl Wegmann (Principal Investigator), North Carolina State University. Tamra Mendelson, University of Maryland, Baltimore County, is primary ichthyologist on project.

The 2011 Mongolian expedition sampled a total of 13 separate sites, 12 of which (Field Numbers MON 11-01 to MON 11-12) yielded fishes preserved for study. One site (MON 11-07B, Shar Us Gol, trib Har Us Gol, Central Depression of Lakes) did not yield fish samples, although young fry of *Barbatula* and *Oreoleuciscus* were later observed in the shallows. An additional site (MON 11-11B, trib Būdūūniy Gol, Gobi Valley of Lakes) was noted as a completely dry bed of a moderately large creek. See Excel Table for descriptions of localities.

A total of 4856 specimens (representing 48 lots; lot = all conspecific specimens from a single collecting event) were preserved in formalin and sent to the Academy of Natural Sciences of Drexel University for sorting and identification. Of that total, 4449 specimens (48 lots) were vouchered and databased at ANSP, and 407 specimens (36 lots) will be returned to Mongolia as a reference collection. Tissue samples (fin clips) were taken from 418 specimens, preserved in 2ml of 100% ethanol, and cataloged at ANSP. See Excel Table for ANSP catalog data for specimens and tissues.

Fish samples represent about 14 species in three Orders (Cypriniformes, Salmoniformes, Perciformes) and six Families (Balitoridae, Cobitidae, Cyprinidae, Salmonidae, Thymallidae, Percidae). All 14 species are represented by tissue samples; almost all of the species collected at any given site were sampled for tissues.

It is highly likely that we collected two undescribed (i.e., “new”) species, both stone loaches (Balitoridae: Nemacheilinae). One, common in the Selenge and possibly from one site in the Gobi Valley of Lakes (MON 11-09), is in the genus *Triplophysa*, and was previously noticed and mentioned by Kottelat (2006). The other appears to be of the genus *Barbatula* (i.e., “big eye” morph), and was collected at one site in the Central Depression of Lakes: Kokh Nuur (MON 11-06, lake site). That species may truly qualify as a “new discovery”, although others have sampled the lake before us (and therefore may have collected the species, but not recognized it as “new”). Additional undescribed species may be among our samples, but are impossible to recognize without a full-scale taxonomic revision of their related, nominal species.

FISHES
Cypriniformes: Balitoridae: Nemacheilinae

Two genera represented in samples: *Barbatula* and *Triplophysa*. For the most part, *Triplophysa* is more slender overall with a longer caudal peduncle, and has a distinctly emarginated (bilobed) caudal fin.

Barbatula is represented by at least 4 morphotypes broadly divisible into two categories: one with nares adjacent, usually with shallowly emarginated caudal fin (*Barbatula* “boldly saddled peduncle” and *Barbatula* “big eye”), and second with nares distinctly separated, usually with truncated caudal fin (*Barbatula* cf. *toni* “leopard morph” and *Barbatula dgebuadzei* “leopard morph”).

Barbatula “boldly saddled peduncle” occurred in all rivers sampled in the Selenge Basin (MON 11-01 to 04), but not at the single lake site (MON 11-05) in the Selenge. *Barbatula* “big eye” occurred at one site in the Central Depression of Lakes: Kokh Nuur (MON 11-06, lake site). The “big eye” species is almost certainly undescribed. It was not sampled in Har Us Gol (river receiving outlet from Kokh Nuur), and may be restricted to lake habitats. Prokofiev (2007:93) figured two specimens that resemble “big eye”, but labeled them as the hybrid *Orthrias sawadai* x *O. barbatulus* (*Orthrias* is considered a junior synonym of *Barbatula*). Collection data for Prokofiev’s specimens is in Russian.

The two “leopard morphs” are quite similar (*B. dgebuadzei* is perhaps slightly more slender). *Barbatula* cf. *toni* is the more common leopard morph, and the most commonly recorded *Barbatula*, taken at all sites sampled in the Selenge Basin (including the lake site, Terkhiyn Tsagaan Nuur), and the two sites in the Central Depression of Lakes (Kokh Nuur and river receiving its outlet, Har Us Gol). *Barbatula dgebuadzei* was collected from two distant sites in separate drainages to the Gobi Valley of Lakes: Dzag Gol (trib Baydragiyn Gol) and Ongi [= Ongiyn] Gol. Their identification is largely based on Prokofiev (2007:76) who reported *B. dgebuadzei* from the same two sites, Dzag Gol being the type locality of the species.

We also likely sampled *B. dgebuadzei* from a third site, Tsagaan Tüüüny Gol (MON 11-09), not reported by Prokofiev (2007). This river is the main eastern branch of Baydragiyn Gol (Dzag Gol being part of the main western branch). The Tsagaan sample is incredibly perplexing. The 33 specimens (of various sizes) grade continuously from *Barbatula dgebuadzei* “leopard morph” with truncate caudal fin & relatively deep caudal peduncle (e.g., tissue sample M327) to a *Triplophysa* morph with weakly emarginated caudal fin & slender caudal peduncle (e.g., M333, M334). The sample exemplifies a general rule of mine: the distinctiveness of subtle taxa is inversely proportional to the number of specimens examined. Molecular data is needed to help determine whether the specimens represent a single polymorphic species, or two distinct lineages either with overlapping morphologies or extensively hybridizing.

Finally, specimens that appear to represent a potentially undescribed species of *Triplophysa* occurred at 3 sites in the Selenge Basin (MON 11-01 to 03) and the

aforementioned one in the Gobi Valley of Lakes (MON 11-09). *Triplophysa* was syntopic with *Barbatula* “boldly saddled peduncle” and *Barbatula* cf. *toni* “leopard morph” at the three Selenge sites, a distinction that the molecular data should corroborate.

Cypriniformes: Cobitidae

Cobitidae was represented by a putatively single species, *Cobitis melanoleuca*, that is highly variable in color pattern. The species was recorded from all 5 sites sampled in the Selenge Basin (including the lake site). It was not recorded from the Central Depression of Lakes, or from the Gobi Valley of Lakes.

Cypriniformes: Cyprinidae

Three putatively unrelated genera are represented in samples: *Leuciscus* (one species), *Phoxinus* (one species) and *Oreoleuciscus* (possibly two species).

Leuciscus idus occurred at only two sites in the Selenge Basin (MON 11-01 and 11-05, the latter a lake site where juveniles of the fish were abundant). *Phoxinus* cf. *phoxinus* was extremely abundant at all 5 sites sampled in the Selenge Basin (including the lake site), but was not recorded from the Central Depression of Lakes, or from the Gobi Valley of Lakes.

Oreoleuciscus was only recorded from the Central Depression of Lakes and the Gobi Valley of Lakes (i.e., non-overlapping with *Leuciscus* and *Phoxinus*). Samples of *Oreoleuciscus* from the Gobi Valley of Lakes (MON 11-08 to 11-12) conform to *O. humilis*, the only species reported for this basin (Bogutskaya, 2001). Specimens of *Oreoleuciscus* from the Central Depression of Lakes (MON 11-06, 11-07) are variable morphologically, particularly for head and overall body shape and orientation of mouth. According to Bogutskaya (2001), who revised the genus, only *O. dsapchynensis* is known from Kokh Nuur and the upper Dzavhan/Zavkhan Gol. Our specimens from those localities, however, do not conform to *O. dsapchynensis* with respect to fin-ray counts. Molecular data are needed to sort out morphotypes of *Oreoleuciscus* throughout its range.

Salmoniformes: Salmonidae

One salmonid species, *Brachymystax lenok*, is represented among samples. Lenok were recorded from three of five sites in the Selenge Basin (MON 11-01, 03, 04), and a single site in the Gobi Valley of Lakes (Dzag Gol, MON 11-08). The lenok from Dzag Gol were likely introduced, as this species is not otherwise known from the Gobi Valley of Lakes. One of the locals communicated this suspicion to Gantsooj Bavuukhand.

Salmoniformes: Thymallidae

Two species of *Thymallus*, *T. cf. arcticus* and *T. brevirostris*, are represented among samples. *Thymallus* cf. *arcticus* occurred in all rivers sampled in the Selenge Basin (MON 11-01 to 04), but not at the single lake site (MON 11-05) in the Selenge. As for the lenok, *T. cf. arcticus* also was recorded from Dzag Gol (Gobi Valley Lakes), where it

was likely introduced. *Thymallus brevirostris* was recorded from a single site, Kokh Nuur (MON 11-06), in the Central Depression of Lakes; it was not collected in Har Us Gol, the river receiving the lake's outlet, though suitable habitat was available. Postlarval specimens (n=55, 16–24 mm SL) of *T. brevirostris* were abundant along calm margins of lake indicating recent spawn. Adult specimens ranged in size from 205 to 355 mm SL.

Perciformes: Percidae

One percid species, *Perca fluviatilis*, was recorded from a single site in the Selenge Basin: Terkhiyn Tsagaan Nuur (a.k.a., White Lake). Small juveniles and subadults were abundant, the latter restricted to submerged vegetation distant from shoreline (beginning at ca. 1.5 m depth).



Barbatula (boldly saddled peduncle), ANSP 192464, Orkhon Gol (Selenge Dr.), MON 11-01



Barbatula (boldly saddled peduncle), ANSP 192129, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Barbatula (boldly saddled peduncle), ANSP 192129, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Barbatula cf. *toni* (leopard morph), ANSP 192130, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Barbatula dgebuadzei (leopard morph), ANSP 192468, Ongi Gol (Gobi Valley of Lakes), MON 11-12



Barbatula (big eye), ANSP 192471, Kokh Nuur (Zavkhan Gol, Central Depression of Lakes), MON 11-06



Barbatula (big eye), ANSP 192471, Kokh Nuur (Zavkhan Gol, Central Depression of Lakes), MON 11-06



Triplophysa, ANSP 192128, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Oreoleuciscus dsapchynensis ?, ANSP 192467, Kokh Nuur (Zavkhan Gol, Central Depression of Lakes),
MON 11-06



Oreoleuciscus humilis, ANSP 192474, Tsagaan Tüüüny Gol (trib Baydragiyn, Gobi Valley of Lakes)
MON 11-09



Phoxinus cf. *phoxinus*, ANSP 192127, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Brachymystax lenok, ANSP 192485, Būdūūn Gichgeniy Gol (trib. Chuluut Gol, Selenge Dr.), MON 11-04



Brachymystax lenok, ANSP 192485, Būdūūn Gichgeniy Gol (trib. Chuluut Gol, Selenge Dr.), MON 11-04



Brachymystax lenok, ANSP 192038, Dzag Gol (Gobi Valley of Lakes), MON 11-08
320 mm SL, angled by Karl Wegmann



Thymallus cf. arcticus, ANSP 192126, Kahnuy [= Hanuy] Gol (Selenge Dr.), MON 11-02



Thymallus cf. arcticus, ANSP 192484, Bütütün Gichgeniy Gol (trib. Chuluut Gol, Selenge Dr.), MON 11-04



Thymallus cf. arcticus, ANSP 192039, Dzag Gol (Gobi Valley of Lakes), MON 11-08



Thymallus cf. arcticus, ANSP 192039, Dzag Gol (Gobi Valley of Lakes), MON 11-08
Angled by Karl Wegmann



Thymallus brevirostris, ANSP 192466, Kokh Nuur (Zavkhan Gol, Central Depression of Lakes),
MON 11-06



Perca fluviatilis, ANSP 192139, Terkhiyn Tsagaan Nuur (White Lake; Selenge Dr.), MON 11-05



MON 11-01: Orkhon [= Orhon] Gol (Selenge Dr.), ca. 7 km north-northwest of Kharkorin. Medium sized river braided at collection site; main channel with swift current up to ca. 1 m deep and low cut banks, opening upstream into broad, shallower riffles; substrate mostly gravel and cobble, forming small shoals; a few boulders in main channel; small backwater arm with soft mud/silt bottom (with *Cobitis* and juvenile minnows); water somewhat turbid, presumably due to recent rains.



MON 11-02: Kahnuy [= Hanuy] Gol (Selenge Dr.), ca. 55 km northwest of Tsetserleg on road to Tariat. Small river with highly sinuous course of riffles, runs and pools less than 1 m deep; substrate mostly gravel and cobble with some mud/silt accumulated in pools; water clear. *Phoxinus* in breeding condition (tuberculate, see photo) collected from deep riffle/shallow run over gravel and small cobble.



MON 11-03: Tamir [= Tamir̄n] Gol (trib. Orkhon, Selenge Dr.), bridge at Ihtamir, ca. 21 km northwest of Tsetserleg. Medium to large river with wide, relatively shallow course broken up by exposed shoals into swift riffles and powerful runs; large shallow backwater with some aquatic vegetation; substrate mostly gravel and cobble in main channels, silt/mud in backwater.



MON 11-04: Būdūūn Gichgeniy Gol (trib. Chuluut Gol, Selenge Dr.), and smaller tributary at and just upstream of confluence, ca. 14 km south of Tariat. Small, shallow (<1m) trib with substrate of gravel/cobble and small boulders of vesicular basalt; dragged bag seine along gravel beach (up to 2m) in moderately wide stream at night; gill net set at mouth of smaller trib, caught nothing but algae (in bloom). School of subadult lenok and grayling accumulated above gill net and caught in textbook bag seine.



MON 11-05: Terkhiyn [= Terkhiin] Tsagaan Nuur (White Lake; Selenge Dr.); along southern shore of western half of lake, ca. 15 km west of town of Tariat. Lake shore with substrate of coarse sand; completely submerged vegetation distant from shoreline (beginning at ca. 1.5 m depth); shallow pools with submerged aquatic vegetation at mouth of small feeder creek (with juvenile cyprinids); juvenile and small adult *Perca* caught off shoreline, presumably from margins of deeply submerged vegetation.



MON 11-06: Kokh [= Höh] Nuur (Dzavhan/Zavkhan Gol, Central Depression of Lakes Dr.), southeastern-most portion of lake. Small twin lakes connected by swift channel up to about 1.5 m deep and 50 m long; channel substrate sand strewn with cobble and large boulders; substrate of channel outlet and lakeshore mostly coarse sand with patches of submerged aquatic vegetation off shoreline. Water extremely clear. Gill net set overnight in swift current upstream from outlet of channel very effective at catching (particularly at shallow end) large *Thymallus* and *Oreoleuciscus*; minnow traps effective for juvenile *Oreoleuciscus* and nemachilines; only small juvenile cypriniforms and *Thymallus* caught in bag seines along lake shore.



MON 11-07: Har Us [= Har Usnī] Gol (Dzavhan/Zavkhan Gol, Central Depression of Lakes Dr.), ca. 5 km north of Gurvanbulag. Small swift river with sinuous course and widely separated braids; substrate mostly large gravel, small cobble; water extremely clear. *Barbatula* taken in good numbers, but only from grassy undercut banks with current; *Oreoleuciscus* seen patrolling open channel (one caught).



MON 11-08: Dzag Gol (trib Baydragiyn Gol, Gobi Valley of Lakes Dr.), downstream of bridge on main road from Gurvanbulag, ca. 10 km northwest of Dzag. Small river with deep swift main channel and some shallow, narrow braids and backwaters. Substrate mostly gravel, small cobble; water clear. Karl angled a nice adult lenok and grayling, latter with fully developed dorsal fin.



MON 11-09: Tsagaan Tüüny Gol (Baydragiyn–Gobi Valley of Lakes Dr.), ca. 16 km north-northwest of Galuut. Moderately sized river with broad bed and long swift riffles and runs (some too deep and powerful to seine). Bottom mostly large cobble and small boulders. Water extremely clear.



MON 11-10: Tuy [= Tüyn] Gol (Gobi Valley of Lakes Dr.), along right bank (west side), ca. 5 km north of Bayanhongor center (upstream of levee). Shallow, extremely broad and well-braided river with deeper backwater pools loaded with *Oreoleuciscus*; some braids with swift current and low cut banks (Mark's attempt to set seine such a braid failed miserably). Substrate mostly cobble and gravel with some submerged aquatic vegetation. Water somewhat clear (slightly more turbid than less disturbed sites).



MON 11-11: Tuy [= Tüyn] Gol (Gobi Valley of Lakes Dr.), along right bank (west side), ca. 5 km north of Bayanhongor center (upstream of levee). Swift narrow creek with a few braids; substrate mostly quartz sand with scattered small boulders supporting mats of partially submerged grasses; water turbid.



MON 11-12: Ongi [= Ongiyn] Gol (Gobi Valley of Lakes), just north of Uyanga. Moderately wide, shallow headwater with some braids and good mix of habitats (pools, riffles, runs). Substrate gravel with scattered conglomerate boulders; backwaters with silty bottom. Water clear.