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Taxonomy is the pioneering exploration of life on earth. Taxonomy lays the foundation for the phylogenetic tree of life, it provides a requisite database for ecology and conservation science and that makes accessible to the vast and still largely unused benefits offered by biodiversity to humanity (Wilson, 2004). Taxonomic information is essential for biological research especially to the fields of biotechnology, bioengineering technology, and bioinformatics and without this knowledge progress in other disciplines will be limited. There are many areas where basic taxonomic information is directly linked to everyday needs such as in the management of fisheries, integrated pest management in agriculture and identification of invasive species.

At present the state of taxonomy is lamentably poor with few individuals working in the field and that inadequate members of people are being trained even though the member of scholars exploring various aspects of the biodiversity of organisms is actually much larger than it has ever been in the past. There is a negative relationship between biodiversity and systematic expertise (Gaston and May 1992), resulting that many species will probably never be identified. This will have major implications for conservation biology planning depends on number of species, reflecting richness, diversity, endemism, threat and many other attributes that can be compared across locations. Data over the past 50 years indicate that the number of named species has grown from *ca* 1.4 to 1.6 million (Raven, 2004) and the task is much greater because no more than 5% of the named organisms are understood in any biological detail.

Apart from Natural History Museum and Zoos, Universities have been largely abandoning the field of taxonomy in favour of new, rapidly expanding biological disciplines. The postulates of the double helical model for DNA and subsequent revolution that has occurred in all fields of biology has excited scientists, students and administrators alike. Consequently resources have been focused in that area.

There are at present a rough estimate of 6000 taxonomists at work world wide on all organisms combined and this is a tiny slice of the biological community as a whole and this discipline remains one of the weakest and under funded (Wilson, 2002.).

Finally nothing will substitute for the activities of field naturalists though, we speak about instant identification through DNA analysis, hand held keys and other modern approaches unless there are many people who identify organisms (Haven, 2004).

Recently the scientific community has been active in developing international initiative in the area of taxonomy and systematics which resulted in BioNET International, species 2000 and the Global Biodiversity Information Facility (GBIF) similar regional initiates by the Tamil Nadu Veterinary and Animal Sciences University through the Fisheries College and Research Institute in Tuticorin to train more and more taxonomists is a valid attempt and this should develop into a level of national initiative in the discipline of fish taxonomy.

Order Cypriniformes

Kinethmoid present (a median bone between ascending processes of premaxillae); palatine articulating in a socket of the endopterygoid; fifth ceratobranchial (the pharyngeal bone) enlarged, with teeth ankylosed to the bone (bound by collagenous fibers to the bone in other ostariophysans with teeth, pharyngeal teeth absent in gyrinocheilids); pharyngeal teeth opposed to enlarged posterior process of basioccipital bone rather than to upper pharyngeal elements, the basioccipital process against which the pharyngeal teeth press usually covered by a pad (tough horny pad in cyprinids, soft pad in catostomids); ascending process to premaxillae; upper jaw usually protractile; mouth (jaws and palate) always toothless; adipose fin absent (except in some cobitoids); head almost always scaleless; branchiostegal rays three; spinelike rays in dorsal fin of some species (Nelson 1994). Five families, 279 genera, and about 2,662 species. The greatest diversity is in southeastern Asia. This taxon is absent from South America. These fishes are popular aquarium fishes, especially the minnows and loaches.

Superfamily Cyprinoidea

Family CYPRINIDAE -minnows or carps. Freshwater, very rarely occurring in brackish water; North America (northernCanada to southern Mexico), Africa, and Eurasia. Pharyngeal teeth in one to three rows, never more than eight teeth in any one row; lips usually thin, not with plicae or papillae (however, mouth sometimes suckerlike as in G*arra* and *Labeo);* barbels present or absent; upper jaw usually bordered only by premaxilla (i.e.. maxilla entirelv or almost entirelv excluded from gape); upper jaw usually protrusible; spinelike rays in dorsal fin in some. *Pectenocypris balaena* of the Kapuas River, Borneo, a phytoplankton feeder, has up to at least 212 gill rakers (Roberts, 1989). The primitive number of chromosomes appears to be 2n == 50 with some species having 48; polyploid states exist, e.g., tetraploids of 2n = 100, hexaploids. or octaploids, in three tribes of the subfamily. Cyprininae (e.g., in *Carassius* and *Cyprinus*) (Buth et al.. 1991). The largest species are the tetraploid barbine *Catlocarpio siamensis* of Thailand, which is known to reach at least 2.5 m and probably 3 m and*Tor putitora* of the Brahmaputra River (eastern India), which reaches about *2.7* m; other large Asian species,(2 m or larger) include *Elopichthys bambusa* and *Barbus esocinus.* The largest north American cyprinid is *Ptycltocheilus lucius* of the Colorado River. Many species are under 5 cm and the smallest cyprinid and the smallest freshwater fish is *Danionella translucida,* a species described from Burma by Roberts in 1986, in which females are ripe at 10-11 mm and the longest specimen known is 12 mm. Recently Kottelat et al (2005) described a new genus *Paedocypris*with two new species *Peadocypris progenetica* and *P. micromegethes* from Sumatra with a fully mature female measuring just 7.9 mm.
The family Cyprinidae is the largest family of freshwater fishes and, with the possible exception of Gobiidae, the largest family of vertebrates. It may be artificially large relative,

especially, to characiform and siluriform families. The common name for the family most frequently used in North America is minnow, while in Eurasia it is carp or barb or barbel. Other common names associated with species of this family and sometimes with those of other families, are chub and shiner; additional common names are given with some of the genera, but in some cases these names are also used for members of other genera, and other names may also be used for species of the genus.

Various members of this family are important as food fish, as aquarium fish, and in biological research. Species particularly widely used include the common carp (and koi) *Cyprinus carpio,* goldfish *Carassius auratus* and zebra danio or zebrafish *Brachydanio rerio.* The genus of the latter species. a popular aquarium fish that is being used extensively in genetic research. Fang (2000a), Fang and Kottelat (2000) and Kottelat (2000) preferred to use the name *Danio* rather than *Brachydanio* for the species with shorter dorsal fins and absent or incomplete lateral line (Full details in the Description of *Danio*).

The earliest definite cyprinid fossils are of Eocene age from Asia; the earliest European and North American ones are of Oligocene age (Oiajian, 1990; Cavender. 1991). Cavender presents reasons for believing that cyprinids were absent from North America in the Eocene, a time when other otophysans were present (catostomids. Hypsidorids, and ictalurids). Major extinctions occurred about 40 and 38 million years ago (Eocene) in the North American faunas when a marked global cooling occurred, perhaps as a result of altering ocean currents when Australia separated from Antarctica (with glaciation in the latter) and exchanges of Arctic and Atlantic waters with an opening between present-day Greenland and Norway.

The recognition and composition of the first seven subfamilies follows Howes (1991 a) and Rainboth (1991). Cavender (1991) and Cavender and Coburn (1992) prefer to recognize

two subfamilies: those with “head usually kept relatively rigid when feeding and having relatively slow swimming movements in feeding” are placed in the Cyprininae, as recognized here, and those with a “head lifting mechanism when feeding and often feeding, with rapid swimming movements” in the subfamily Leuciscinae (the next six subfamilies recognized here). This corresponds with the two phyletic; lineages recognized in Chen et al. (1984) and Wu (1987): the Barbini with four subfamilies-the Tincinae, Barbinae. Cyprininae, and Labeoninae and the Leuciscini with six subfamilies: the Danioninae, Leuciscinae, Culturinae, Xenocyprinae, Gobionina, and Acheilognathinae. The Psilohynchidae is recognized as a subfamily following the 1981 phylogenetic: study of Chen (Wu et al., 1981; Wu, 1987).

Family Cobitidae-Loaches

Body wormlike to fusiform; mouth subterminal; 3-6 pairs of barbles present: erectile pine below eye; one row of pharyngeal teeth. Greatest diversity in southern Asia. Bottom dwellers. Maximum length 40 cm. The accepted spelling of the family name is Cobitidae, not Cobitididae (Nelson, 1994).

Subfamily : Cobitinae

One pair of barbles (rarely absent); caudal fin usually rounded or slightly emarginate (forked in *Lepidocephalichthys*).

Subfamily : Botinae

Two pairs of rostral barbles, caudal fin deeply forked; body compressed. Three genera with about 40 species. The genus Botia is represented in India.

Family Balitoridae - River Loaches

Balitorids may be recognized as a separate lineage from cobitids by differences in the weberian apparatus (Sawada, 1982).

Subfamily : Nemacheilinae

Prepalatine present; no spine under or below fore eye; two pairs of rostral barbels and one pair of maxillary barbels; body elongate, rounded or compressed; mouth subterminal; single unbranched in pectoral and pelvic fins. Adipose crest present in some; Most of the species in Indian subcontinent, Indo china and China.

Subfamily : Balitorinae-Flat Loaches

Exoccipitals separated from each other; interhyal absent; mesocoracoid fused with an enlarged cleitherum; three or more pairs of barbels present ; gill opening restricted or not; paired fins enlarged with adhesive pads on ventral surface, oriented horizontally; pelvic fin separated or united under belly. These fishes, commonly known as hillstream loaches, have the body and head flattened. Mouth subterminal and paired fins adapted as adhesive organs. Found in fast flowing mountain streams from India through Southeast Asia. Kottelat (1988) considers the well known name Homalopteridae a junior synonym of Balitoridae.

Morphometric Measurements for Cyprinids

Measurements made as in Hubbs and Lagler (1964), with additions and modifications based on Rainboth (1996) Numbers 1 to 32 are the original measurements and numbers 33 to 45 the additional truss measurements.

1. *Standard length* extends from the anteriormost portion of the snout to the base of the middle caudal rays. It is referred to as “SL”.
2. *Snout to urocentrum* is similar to SL, but measures the length of the head and spinal column. extending from the snout tip to the posterior edge of the urocentrum. The urocentrum is found at the point where the last myoseptum intersects the horizontal septum and can be felt with the caliper points on small or soft specimens.
3. *Preanal length* measures body length to the anteriormost base of the unbranched anal-fin rays (anal-fin origin).
4. *Predorsal length* measures body length to the anteriormost base of the unbranched dorsal-fin rays (dorsal-fin origin).
5. *Prepelvic length* measures from the anteriormost point of unbranched pelvic-fin rays (pelvic-fin (insertion) to the tip of the snout.
6. *Prepectoral length* is the distance from snout tip to the point of pectoral-fin insertion.
7. *Preoccipital length* measures to the posterior edge of the cranium at the dorsal midline.
8. *Snout to* posterior margin of *preopercle* measures horizontal distance from the snout (not from possibly projecting lower or upper lips) to the posterior edge of the preopercle.
9. *Upper jaw length* measures the distance from the anterior edge of the premaxilla to the posterior edge of the maxilla.

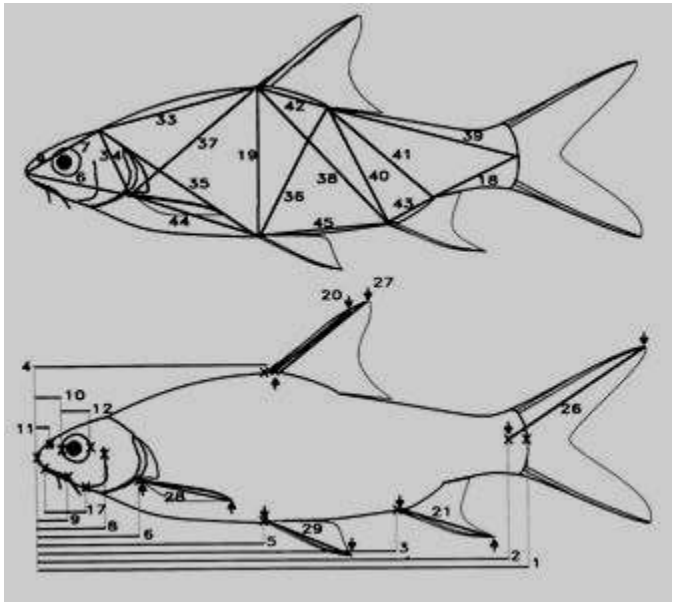
10. *Snout length* measures from the anterior bony rim of the orbit to the tip of the snout, not including lips.
11. *Prenasal length* extends from the center of the nasal valve to the tip of the snout, because the soft skin on the edges can contract with drying, but the valve does not move.
12. *Orbit width* is taken on the widest horizontal plane from bone to bone.
13. *Interorbital width* is measured from the plane passing through the center of the pupil, because the supraorbitals vary in placement for different groups of barbels.
14. *Internasal width* can be taken from/to bony margin. It might also be referred to as width of ethmoid. This measurement is difficult to repeat with precision, because differing thicknesses of soft tissue can cause different lower caliper readings.
15. *Head width* can be taken with the caliper points placed at the nondilated preopercles.
16. *Gape width* is taken with the mouth shut and width compressed even if the mouth has been preserved in an expanded position. The caliper tips should be placed at the posterior edge of the furrow between the upper and lower lips at the angle of the jaws.
17. *Lower jaw to isthmus* extends from the anterior point of the mandibular symphysis to the hypohyal on specimens with closed pharynges, but is difficult to take when the pharynx is expanded.
18. *Peduncle length* is measured from termination of the anal-fin base to the caudal-fin base.
19. *Dorsal* origin *to pelvic* insertion is the body-depth measurement because it measures from point to point. This completes a snout to dorsal to pelvic triangle for use in shape analysis.

20. *Dorsal spinous-ray length* is measured from the basal articulation to the point where flexibility begins. Specimens with a weak or no spinous ray still have a basal region which is largely inflexible. Weakly-spined species usually show more incomplete articulations before the spine becomes flexible than heavily-spined species. Strongly- spined species usually have one or two partial articulations before the first fully flexible articulation.
21. *Anal-fin height* can be taken as the total length of the last anterior unbranched ray.
22. *Head depth at nostril* is measured as nearly vertical as possible at the nasal valve. This is a difficult measurement on which to achieve repeatable results, since it is not taken from landmark to landmark.
23. *Head depth at pupil* is measured along an imaginary vertical line passing through the center of the pupil. This is also a difficult measurement, especially on specimens with gaping mouths.
24. *Head depth at occiput* is taken from the posterior margin of the cranium at the dorsal midline on a vertical axis. The ventral position ends slightly posterior to the area where the gill membranes of each side fuse to the isthmus. This can be modified easily to end on the gill membrane-isthmus junction when calipers are used.
25. *Peduncle depth* can be taken at the region of least depth.
26. *Caudal-fin length* is measured from the urocentrum out the longest principal ray of either the upper or lower lobe, when spread to a natural position.
27. *Dorsal-fin height* can be is taken as the length of the last of the anterior unbranched rays.
28. *Pectoral-fin length* can be taken as the greatest extension of depressed fin from insertion, measured over the outer surface. The longer of the two fins is used.

29. *Pelvic-fin length* taken in the same manner as the pectoral fin, with the longer of the two pelvic fins being used.
30. *Pelvic axillary-scale length* is taken from the point of pelvic insertion to the posterior tip of the axillary scale. In the species that have one scale at the base of the axillary papilla and another extending posteriorly, the posteriormost extension is measured. The longer measurement from either side can be used.
31. *Maxillary barbel* length measures the length of the barbel at the angle of the gape from the anterior edge of the often bulbous base to its full posterior extension. The greater measurement from either side can be used.
32. *Rostral barbel* length is the measure of the anterior barbel found at the junction of the lacrimal groove with the maxillary groove, at what is typically referred to as the most posterior point of the rostrum as bounded by the lacrimal groove on each side of the head. It is actually an anterior maxillary barbel and so is referred as the “rostral” barbel for the sake of brevity in the species accounts.
33. *Occiput to dorsal origin* is measured from the posterior margin of the cranium at dorsal midline to the base of the first unbranched dorsal ray in the erect fin.
34. *Occiput to pectoral insertion* can be taken from the posterior margin of the cranium at dorsal midline to the point of pectoral insertion at the anterior base of the fin.
35. *Occiput to pelvic insertion* is the distance from the same occipital point mentioned in the previous two measures to the point of pelvic-fin insertion at the base of the unbranched ray.
36. *Dorsal insertion to pelvic insertion* extends from the base of the posteriormost dorsal ray to the point of pelvic-fin insertion.

37. *Dorsal origin to pectoral insertion* is, as the name implies. from landmarks just described.
38. *Dorsal origin to anal origin* measures the distance from the base of the first unbranched ray in the erect dorsal fin to the base of the first unbranched ray in the erect anal fin.
39. *Dorsal insertion to caudal base* can be taken from the base of the posteriormost dorsal ray to the base of the caudal rays at the center of the peduncle, as in the conventional SL measurement.
40. *Dorsal insertion to anal origin* extends from the base of the posteriormost dorsal ray to the base of the first unbranched ray of the erect anal fin.
41. *Dorsal insertion to anal insertion* measures the distance between the bases of the posteriormost rays of the dorsal and anal fins.
42. *Dorsal-fin base* is measured from the base of the first unbranched ray to the base of the posteriormost ray in the erect fin.
43. *Anal-fin base* is measured in a manner similar to the dorsal-fin measure immediately preceding.
44. *Pectoral insertion to pelvic insertion* is the distance between the bases of the unbranched anterior rays of the pelvic and pectoral fins.
45. *Pelvic insertion to anal origin* is the distance between the bases of the anteriormost rays of the pelvic and anal fin

Morphometric measurements (original and truss) based on Rainboth (1996)



Meristic Counts for Cyprinids

Most meristic counts are as in Hubbs and Lagler (1964).

1. *Unbranched dorsal rays* on the anterior margin of the fin articulate with the first two pterygiophores. Three unbranched rays are found on the first pterygiophore, and the last unbranched ray (the serrated spine), alone, is found on the second pterygiophore.
2. *Branched dorsal rays* follow the unbranched rays and are counted as the number of separate, *evenly placed.*
3. *Unbranched anal rays,* like their dorsal counterparts, are found on the first two pterygiophores of the anal fin. Two unbranched rays articulate with the first pterygiophore and the last unbranched ray articulates with the second pterygiophore.
4. *Branched anal rays* follow the unbranched rays and are counted as is done for the dorsal fin.
5. *Branched pelvic rays* include all rays medial to the principal unbranched ray. The count was usually taken on the left side unless the fin was damaged or abnormally developed.
6. *Branched pectoral rays* are counted in a manner equivalent to the branched pelvic-ray count.
7. Caudal-fin *upper-lobe procurrent rays* can be counted after making a small incision on the right side of the peduncle to remove portions of scales which overlay these tiny rays anterior to the principal ray.
8. Caudal-fin *lower-lobe procurrent rays* can be dissected in the same manner as described for the upper lobe.

9. *Total gill rakers* include all gill rakers on the anterior (leading) edge of the entire first gill arch.
10. *Epibranchial gill rakers* denotes those found on the leading edge of the first epibranchial bone. Although one may occur close to the articulation of the epibranchial with the ceratobranchial, very few examples were found where attachment could not be determined. Any problematic rakers were included as part of the greater count on either the upper or lower arm.
11. *Ceratobranchial gill rakers* are those found on the leading edge of the lower arm (ceratobranchial and rarely part of the hypobranchial) of the first arch.
12. *Lateral-line scales* include only those anterior to the caudal-fin base, extending to and including the first to touch the cleithrum.
13. *Predorsal scales* are counted on the dorsal midline.
14. *Upper transverse rows* are counted diagonally forward from (but excluding) the lateral line and include the last scale of the predorsal midline. Because the last predorsal scale is included at unit value, there are no half-scale counts for this character.
15. *Lateral line to pelvic* scale rows are taken on a forward diagonal from the lateral line and include the scale row that surrounds the point of pelvic-fin insertion. Rarely, this can be difficult to judge, but it is usually simple, especially on the large-scaled specimens.
16. *Lower transverse rows* are counted on a backward diagonal from the lateral line to include the midline scale row between the anus and anal fin.
17. *Circumpeduncular scales* are taken at the region of the least depth of the caudal peduncle.

18. *Circumferential scales* are counted through the last full-scale rows anterior to the dorsal and pelvic fins, rather than farther forward on the belly where there may be more rows but insufficient landmarks to direct the count, resulting in additional counting error.
19. *Transverse breast rows* are counted from the posteriomedial edge of the base of the pectoral fin to the same position on the opposite side.
20. *Snout tubercles* include all tubercles anterior to the lacrinal groove. If only scars are present, they are counted as if they contain the recently shed tubercle.
21. *Cheek tubercles* include all tubercles following the lacrimal groove, below the nostril and orbit, anterior to the preopercle. Scars are counted as above.

Anal scale rows are counted as the number of free-edged scale rows between the anus and the anal fin.