

- **RELATIONSHIP BETWEEN TOAL AND STANDARD LENGTHS:** To relate fisheries data and systematic data it is often necessary to know the relationship of these measurements in a particular species. Therefore, both should be recorded in early samples, over the whole size range, to enable a curve to be constructed for conversion of one to the other in later work.
- **BODY DEPTH:** This is taken at the deepest point, exclusive of fleshy or scaly structure at fin bases.
- **HEAD LENGTH:** This is measured, with the mouth closed, from the tip of the snout or upper lip (whichever extends farthest forward) to the posterior edge of the opercular bone or to the extremity of the membrane margining the bone (depending on the author), but excluding the opercular spines if these are present.
- **HEAD WIDTH:** This is the greatest dimension, with gill covers closed in normal position.
- **SNOUT LENGTH:** This is taken with dividers from the most anterior point on the snout or upper lip (whichever extends farthest forward) to the front margin of the orbit.
- **POSTORBITAL LENGTH OF HEAD:** This is the greatest distance between the hind margin of the orbit and the bony opercular margin (some authors use the membraneous opercular margin as the posterior extremity of measurement).
- **INFRAORBITAL DEPTH:** Generally taken from the bony edge of the orbit to the margin of the first infraorbital bone (preorbital = lachrymal) at its deepest point; sometimes taken as the 'least' measurement from orbits to infraorbital ring margining; usage varies with group of fish and author.
- **INTERORBITAL WIDTH:** Unless specified as least fleshy width, this is the least bony width, from orbit to orbits.
- **EYE DIAMETER** This is generally taken as length of orbit, the greatest distance between the free orbital rims, and is often oblique.
- **UPPER JAW:** Upper jaw length is taken from the anteriormost point of the premaxillary to posterior point of the maxillary.
- **LOWER JAW:** Lower jaw length is the length of

the mandible, taken with one tip of the dividers inserted in the posterior mandibular joint to give the maximum possible dimension.

- **GAPE WIDTH:** This is the greatest transverse distance across the mouth opening, with the mouth closed.

- **Other characters: GILL RAKERS:** Unless otherwise stated, the count is that of the first arch, and often of the lower limb only, or of the two limbs separately. The junction of the two limbs can be felt with a divider point, and if a gill raker straddles the angle of the arch, this is generally included in the lower-limb count, as are all rudimentary gill rakers at the anterior end.

- **TEETH:** The numbers and kinds of jaw teeth, number of tooth rows, and (as in siluroids) the relative widths and shapes of vomerine and palatine tooth bands may be useful characters.

- **LOWER PHARYNGEAL BONES:** These represent the modified fifth gill arches. The bones may be more or less C-shaped and paired (as in Cyprinidae), but the two are sometimes united into a triangular median plate (as in Cichlidae). Their shape, toothed area, and the type and density of teeth on them, are very important characters for the identification of fish of these two families, among others. To remove the bone incichlids, lift the left gill cover, continue forward with scissors the slit between the fourth gill arch and the blade of the lower pharyngeal bone; then cut the membrane along the side of the bone and the muscles joining its hind corner to the shoulder girdle. Do the same on the other side, being careful not to cut the anterior blade. Cut the bone clean away from the oesophagus and from the tissues beneath it; remove bone, clean off soft tissues and let it dry. The teeth can then be examined with a lens, and the bone replaced if the specimen is to be kept (if not, a more drastic method of removal can be used).

- **PHARYNGEAL (THROAT) TEETH:** These often have to be counted among cyprinids, for precisions in identification. For this the pharyngeal bones have to be temporarily removed (with great care) and cleaned.

Each bone bears 1 to 3 rows of teeth. Teeth in each row are counted and given a formula in order from left to right; thus '2,5-4,2' indicates that the left pharyngeal has 2 teeth in an outer row and 5 in an inner one, whereas the right has 4 in the inner and 2 in the outer row; the formula 4-4 discloses that teeth are present in one row only.