**Appendix 1.** Morphological characters and states of each character in species used in this study

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| Characters  Species | Shape | Anterior region | Posterior region | Sulcus acusticus | Crista superior | Crista inferior | Ostium |
| *Mulloidichthys vanicolensis* | Elliptic | Double peaked | Angled | Heterosulcoid, ostial, median | Distinct and ridge-like/Well development | Distinct and ridge-like/Well development | Rectangular |
| *Parupeneus heptacanthus* | Elliptic to oval | Peaked to blunt | Round to angle | Heterosulcoid, ostial, median | Distinct and ridge-like/Well development | Distinct and ridge-like/Well development | Funnel-like |
| *Parupeneus margaritatus* | Elliptic to lanceolated | Peaked to blunt | Round/ Irregular | Heterosulcoid, ostial, median/ straight | Distinct and ridge-like/ well development but broken | Distinct and ridge-like/Well development | Funnel-like |
| *Parupeneus rubsence* | Elliptic to lanceolated | Peaked to blunt | Round/ Irregular | Heterosulcoid, ostial, median/ straight | Distinct and ridge-like/ well development but broken | Distinct and ridge-like/Well development | Funnel-like |
| *Upeneus doriae* | Elliptic | Peaked | Oblique | Heterosulcoid, ostial, supramedian | Distinct and ridge-like/Well development | Distinct and ridge-like/Well development | Funnel-like, shorter than the cauda |
| *Upeneus guttatus* | Elliptic | Blunt, a well-developed tip that forms acute angle | Oblique to angled, regularly curved | Heterosulcoid, ostial, supramedian | Distinct and ridge-like | Distinct and ridge-like | Funnel-like to elliptic, shorter than the cauda |
| *Upeneus pori* | Fusiform to a trapezoid | Blunt, a well-developed tip, sometimes pointed | Rounded, oblique to angled | Heterosulcoid, ostial, median | Distinct and ridge-like | Distinct and ridge-like | Funnel-like to elliptic, shorter than the cauda |
| *Upeneus sundaicus* | Elliptic to fusiform | Wide and thick | Oblique and angled, rounded | Angle to oblique/ Heterosulcoid, ostial, medium | Distinct and ridge-like/Well development | Distinct and ridge-like/Well development | Funnel-like to elliptic, shorter than the cauda |
| *Upeneus tragula* | Elliptic | Peaked | Oblique | Heterosulcoid, ostial, supramedian | Distinct and ridge-like | Distinct and ridge-like | Funnel-like to elliptic, shorter than the cauda |
| *Upeneus vittatus* | Elliptic | Peaked | Oblique | Heterosulcoid, ostial, supramedian | Distinct and ridge-like/Well development | Distinct and ridge-like/Well development | Funnel-like to elliptic, shorter than the cauda |

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| Characters  Species | Cauda | Dorsal margin | Ventral margin | Rostrum | Rostrum size | Rostrum shape | Excisura |
| *Mulloidichthys vanicolensis* | Slightly curved ending close to the posterior margin | Lobed forming more or less conspicuously irregular, slightly emarginated | Lobed forming more or less conspicuously irregular, slightly emarginated | Round and irregular | Medium | Round | U-Shape and deep |
| *Parupeneus heptacanthus* | Cauda elliptic, curved, markedly flexed from the middle region | Ridge like /slightly irregular, slightly emarginated | Ridge like /slightly irregular, slightly emarginated | Pointed | Large | Broadly pointed | U-Shape or V-Shape/ deep |
| *Parupeneus margaritatus* | Curved to elliptic/ tubular, strongly curved | Enteric | Enteric | Thick and blunt | Large | Pointed to round | V-Shape/ deep |
| *Parupeneus rubsence* | Cauda elliptic, curved, markedly flexed from the middle region | Enteric | Enteric | Thick and blunt | Large | Pointed to round | V-Shape/ deep |
| *Upeneus doriae* | Curved, tubular, markedly flexed from the middle region | Wavy forming or less conspicuous round/ slightly irregular | Wavy forming or less conspicuous round/ slightly irregular | Short, very broad, blunt | Large | Pointed | Wide, without a notch |
| *Upeneus guttatus* | Curved to Oval/ descending | Enteric/ well development/ slightly emarginated | Enteric/ well development/ slightly emarginated | Pointed to round | Large | Pointed | U-shape, sometimes V-shape |
| *Upeneus pori* | Curved to oval, ending close to the posterior margin | Wavy forming more or less conspicuously round, slightly emarginated | Wavy forming more or less conspicuously round, slightly emarginated | Blunt to pointed | Large | Pointed | V-Shape, deep |
| *Upeneus sundaicus* | Curved to oval, ending close to the posterior margin | Slightly irregular, Slightly emarginated/ Enteric | Slightly irregular, Slightly emarginated/ Enteric | Pointed, sometimes rounded | Large | Pointed | U-shape, sometimes V-shape |
| *Upeneus tragula* | Tubular, curved, markedly flexed posteriorly, ending in the posterior-ventral region | Composed of conspicuous and irregularly spaced protuberances | Composed of conspicuous and irregularly spaced protuberances | Short, very broad, pointed, sometimes blunt | Large | Pointed to round | V-shape and deep or U-shape, without a notch |
| *Upeneus vittatus* | Tubular, curved, markedly flexed posteriorly, ending in the posterior-ventral region | Slightly irregular, Slightly emarginated/ Enteric | Slightly irregular, Slightly emarginated/ Enteric | Broadly pointed | Large | Long Pointed | Wide, without a notch |