

## THE KEYS AND HOW TO USE THEM

AFTER a fish has been caught it is sometimes important to determine its species. This is not always easy, and in Ceylon it is sometimes quite difficult, because there are more than 675 species recorded from here. The keys presented are intended to simplify this task of identification. Accordingly they deal as far as possible with readily examinable external characteristics that have diagnostic value.

In the interest of brevity and precision it has been necessary to make use of technical terms although they have been avoided wherever possible. To assist those unfamiliar with these terms a glossary is included in front of the Bulletin together with descriptive illustrations. These should make the meaning of every technical term used quite clear.

Most fish included in the catalogue will conform with one of the two or more bracketed descriptions provided at each of the several stages of the 'running down' that is involved in species identification. The idea is to follow through the descriptions that suit the fish by successive references to the parts of the key as indicated. It has not been possible to include in the keys all the fish in the catalogue as sufficient data is unavailable for a few.

The first decision to make is to what class the fish belongs, then order, superfamily, family, subfamily, genus and finally species, which is what is to be determined. In some cases this requires the examination of relatively few characteristics but with others the task is long and involved.

The use of the key is best illustrated by taking a specific example, for instance *Rasbora vaterifloris* Deraniyagala, known as the *hal mal titheya* or *hal mal dhandiya* in Sinhalese and as the *golden rasbora* in English (it has no Tamil name so far as is known), and trying to "run it down" in the regular fashion as if it were an unknown species that had to be identified.

This fish has a true bony skeleton, ctenoid scales, a single opening to the exterior from each gill chamber, ventral fins that are abdominal in position, a single spineless dorsal fin, gill membranes that are broadly united with the isthmus, jaws toothless, body with scales, 3 branchiostegals, pseudobranchiae present, teeth in roof of mouth, no barbels, rounded abdomen, an interrupted lateral line which is closer to the ventral edge than to the dorsal edge of the body, and 11-12 predorsal scales.

The first task is to determine which class the fish belongs to. Reference to page 16 and the above description shows that the fish belongs in class **Teleostomi** (page 17) and reference must be continued there.

**Rasbora** lacks the perch-like characteristics which would lead us to Order **Perciformes** of this class (see introduction to **Teleostomi** page 16) so reference is made to the key to the rest of this class, starting with the first bracketed set of characters on page 17 :—

- |   |   |                   |    |                          |         |
|---|---|-------------------|----|--------------------------|---------|
| 1 | { | Body asymmetrical | .. | <b>Pleuronectiformes</b> | Page 34 |
|   |   | Body symmetrical  | .. | 2                        |         |

The body of **Rasbora** is symmetrical as stated in the general description above. It cannot be classed therefore with **Pleuronectiformes**. The only alternative is to continue through 1 to bracket 2 :—

- |   |   |  |    |                    |         |
|---|---|--|----|--------------------|---------|
| 2 | { | Ventral fins present   | .. | 9                  |         |
|   |   | Ventral fins if present, in the form of spines or pelvic projections | .. | <b>Balistoidei</b> | Page 40 |
|   |   | Ventral fins absent  | .. | 3                  |         |

The presence of normal ventral fins leads through to bracket 9 :—

- |   |   |                              |    |    |
|---|---|------------------------------|----|----|
| 9 | { | Ventrals abdominal           | .. | 10 |
|   |   | Ventrals thoracic or jugular | .. | 18 |

The ventrals in **Rasbora** are abdominal, so the next step is through bracket 10 :—

- |    |   |                  |    |    |
|----|---|------------------|----|----|
| 10 | { | Body with scales | .. | 12 |
|    |   | Body naked       | .. | 11 |

The presence of scales leads to bracket 12 :—

- |    |   |  |    |    |
|----|---|--|----|----|
| 12 | { | 1 spineless fin on back (an adipose fin may also be present) | .. | 14 |
|    |   | 2 fins on back   | .. | 13 |

*Rasbora's* single spineless dorsal directs reference to bracket 14 :—

- |    |   |   |    |                    |         |
|----|---|---|----|--------------------|---------|
| 14 | { | Gill membranes broadly united with the isthmus ; no teeth in jaws | .. | <b>Cyprinoidei</b> | Page 24 |
|    |   | Gill membranes free from isthmus ; jaws generally with teeth      | .. | 15                 |         |

*Rasbora's* characters obviously place it with the **Cyprinoidei**. This is a large group and a second key for the fish within it is to be found on page 24 as indicated above. Reference must now be made to it starting with bracket 1 :—

- |   |   |   |    |   |
|---|---|---|----|---|
| 1 | { | Mouth inferior with 6, 8 or more barbels ; simple moveable spine near eye | .. | 2 |
|   |   | Mouth anterior or inferior ; never more than 4 barbels                    | .. | 5 |

*Rasbora* as described above, has no barbels, i.e., there are 'never more than 4', which means continuation of reference through to bracket 5 :—

- |     |   |                        |
|-----|---|------------------------|
| 5 { | At least part of abdomen compressed into an edge .. | <b>Laubuca laubuca</b> |
|     | Abdomen not compressed but rounded or flattened ..  | 6                      |

*Rasbora* has a rounded belly and cannot therefore be identified as **Laubuca laubuca**. Reference must continue through to bracket 6 :—

- |     |   |    |
|-----|---|----|
| 6 { | Lateral line in middle of tail ..                 | 12 |
|     | Lateral line if present, close to ventral edge .. | 7  |

*Rasbora's* lateral line is close to ventral edge so reference is through bracket 7 :—

- |     |                    |    |
|-----|--------------------|----|
| 7 { | Barbels absent ..  | 8  |
|     | Barbels present .. | 11 |

*Rasbora* has no barbels so reference is through bracket 8 :—

- |     |                         |                              |
|-----|-------------------------|------------------------------|
| 8 { | Lateral line present .. | 9                            |
|     | Lateral line absent ..  | <b>Horadandiya atukorali</b> |

The lateral line is present in *Rasbora* so it cannot be identified as **Horadandiya atukorali**. Reference must continue through bracket 9 :—

- |     |                           |                                    |
|-----|---------------------------|------------------------------------|
| 9 { | Predorsal scales 28–30 .. | <b>Amblypharyngodon melettinus</b> |
|     | Predorsal scales 11–17 .. | 10                                 |

*Rasbora's* predorsal scale count is 11–12 and directs reference through bracket 10 :—

- |      |                            |                             |
|------|----------------------------|-----------------------------|
| 10 { | Lateral line complete ..   | <b>Rasbora daniconius</b>   |
|      | Lateral line incomplete .. | <b>Rasbora vaterifloris</b> |

The incompleteness of the lateral line identifies the fish as **Rasbora vaterifloris**.

To discover the common names of this fish reference must be made first of all to the index of scientific names at the back of the bulletin. This shows that the species is listed as number 99 in the catalogue and catalogue reference shows that this fish is *hal mal tittaya* or *hal mal dhandiya* in Sinhalese and *golden rasbora* in English. There is no common Tamil name.

Reference to 'Systematic Synopsis of the Catalogue', page 155 shows the systematic position of the fish in modern classification.

Should the reader wish to learn more about this fish in so far as Ceylon is concerned, he may go to the literature referred to in the catalogue in contracted forms. Deraniyagala is the only person who has written on this species and he has published three reports as the contractions show. Reference to the section 'Bibliography of literature relating to fish and fisheries of Ceylon', page 181 of this Bulletin gives fuller details about these reports, their titles and where and when they were published :—

1. 'The Eventognathi of Ceylon' appeared in the journal, 'Spolia Zeylanica' and may be found on pages 1-41 of its sixteenth volume which was published in 1930 ;

2. 'Names of some fishes from Ceylon', appeared in the 'Ceylon Journal of Science', section C, pages 79-111 of volume 5, published in 1933 ; and

3. 'A Coloured Atlas of Some Vertebrates from Ceylon, Volume 1, Fishes', is a 1952 publication of the National Museums of Ceylon.

This rather long introduction to the keys seems necessary to insure the proper and full use of the Bulletin. So much information is compressed within its covers that the beginner cannot be expected to realise its usefulness without such an explanation.

## KEY TO THE CLASSES

1	<p>Skeleton cartilaginous ; scales placoid ; single external opening to nasal organ of each side ; 5-7 external gill openings on each side of the body ; males with projections of the ventral fin termed <b>claspers</b> ; cloaca present—Sharks, Skates and Rays ..</p>	<b>Elasmobranchii</b>	Page 78
	<p>Skull bony ; external opening to gill chamber single on each side ; usually two external openings to nasal organs—Bony fishes <b>Teleostomi</b> see below ..</p>	2	
2	<p>Fins usually with spines ; maxillary excluded from gape ; premaxillary distinct ; usually two dorsal fins, the first spinous, the second soft rayed ; two dorsals may be separate or confluent ; ventral with not more than six rays, usually 1 spine and 5 rays ; caudal fin with not more than 17 principal rays ; eyes and head symmetrical ..</p>	<b>order Perciformes</b>	Page 42
	<p>All other orders not having combination of characters of order <b>Perciformes</b> above ..</p>		*Page 17

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\*This key also contains some sub-orders and superfamilies of the order Perciformes.

**Class TELEOSTOMI Other than  
the Order Perciformes**

1	{	Body asymmetrical ..	<b>Pleuronectiformes Page 34</b>
		Body symmetrical ..	2
2	{	Ventral fin present ..	9
		Ventral fins, if present in form of spines or pelvic projections ..	<b>Balistoidei Page 40</b>
		Ventral fins absent ..	3
3	{	Body anguilliform ..	4
		Not anguilliform ..	6
4	{	Dorsal and anal fins spineless ..	5
		Dorsal and anal spined ..	<b>Mastocembeliformes Page 38</b>
5	{	Pectoral absent ; dorsal and anal rayless folds of skin ; mouth bordered by intermaxillaries ..	<b>Symbranchiformes Page 29</b>
		Dorsal and anal rayed ; mouth bordered by maxillaries ..	<b>Anguilliformes Page 26</b>
6	{	Scales thickened to form a carapace ..	7
		Scales normal if present ..	8
7	{	Teeth not fused ..	<b>Balistoidei Page 40</b>
		Teeth fused into one unit in upper and lower jaw ..	<b>Tetrodontoidei Page 42</b>
8	{	Body ovate or oblong ..	<b>Stromateoidei Page 74</b>
		Body elongate ..	<b>Trichiuroidei Page 76</b>
9	{	Ventrals abdominal ..	10
		Ventrals thoracic or jugular ..	18
10	{	Body with scales ..	12
		Body naked ..	11
	{	Skin naked or with bony scutes ; barbels present ..	<b>Siluroidei Page 22</b>
		Snout produced, tube like ; no barbels ..	<b>Syngnathiformes Page 29</b>
12	{	1 spineless fin on back. (An adi- pose fin may also be present) ..	14
		2 Fins on back ..	13
13	{	Snout produced, tube like ..	<b>Syngnathiformes Page 29</b>
		No tube like snout ..	<b>Mugiliformes and Polynemi- formes Page 31</b>

14	{ Gill membranes broadly united with isthmus, no teeth in jaws	<b>Cyprinoidei</b> Page 24
	{ Gill membranes free from isthmus, jaws generally with teeth ..	15
15	{ Lateral line when present normally situated along upper half of sides without forming a raised ridge ..	17
	{ Lateral line low on body forming a raised edge ..	16
	{ No lateral line ..	<b>Cyprinodontiformes</b> Page 33
16	{ Tail tapering to a point; ventral 1 spine and 9 rays ..	<b>Halosauriformes</b> Page 29
	{ Tail not tapering to a point; ventral 6 rayed ..	<b>Beloniformes</b> Page 30
17	{ An adipose fin typically present	<b>Scopeliformes</b> Page 22
	{ No adipose fin ..	<b>Clupeiformes</b> Page 19
18	{ Ventral fin with 1 spine and 5 rays ..	25
	{ Not with 1 spine and 5 rays ..	19
19	{ Upper jaw produced and sword shaped ..	<b>Scombroidei (Istiophoridae)</b> Page 77
	{ Upper jaw not produced ..	20
20	{ Scales present ..	21
	{ Scales absent or greatly reduced ..	23
21	{ Head with mucous cavities (or if no mucous cavities visible, ventral of 1 spine and 7 rays)	<b>Beryciformes</b> Page 35
	{ No mucous cavities ..	22
22	{ Anal spines seven ..	<b>Siganoidei</b> Page 75
	{ Anal spines two or three ..	<b>Acanthuroidei</b> Page 75
23	{ Front dorsal spines modified to form movable lure with fringes, filaments or even luminous organs ..	<b>Lophiiformes</b> Page 37
	{ No such modified dorsal spines ..	24
24	{ First dorsal more than 4 spines	<b>Blennioidei</b> Page 78
	{ Head compressed; First dorsal with 2-4 short stout spines ..	<b>Batrachoidiformes</b> Page 38
25	{ 1 dorsal fin ..	26
	{ 2 dorsal fins ..	34
26	{ Dorsal fin with spines ..	27
	{ Dorsal fin without spines ..	<b>Ophiocephaliformes</b> Page 32

27	{	Lateral line interrupted .. 28	
		Lateral line complete .. 31	
28	{	Anal spines more than three .. 29	
		Anal spines one or two .. 30	
2	{	Anal spines twelve or more .. <b>Cichlidae Page 38</b>	
		Anal spines six or less .. <b>Labroidae Page 70</b>	
30	{	Scales cycloid .. <b>Labroidae Page 70</b>	
		Scales ctenoid .. <b>Pomacentroidae Page 73</b>	
31	{	Body oblong, compressed .. 32	
		Body elongate .. 33	
32	{	Caudal peduncle with one or more bony plates or scutes .. <b>Acanthuroidei Page 75</b>	
		No bony plates or scutes .. <b>Labroidae Page 70</b>	
33	{	Teeth present on vomer .. <b>Trachinoidei Page 74</b>	
		No teeth on vomer .. <b>Labroidae Page 70</b>	
34	{	Ventral fins close together or united; lateral line absent .. 35	
		Ventral fins separated; lateral line present .. 36	
35	{	Anal spine single .. <b>Gobiformes Page 38</b>	
		Anal spines three or none at all .. <b>Cottiformes Page 36</b>	
36	{	Spinous dorsal & sucking disc .. <b>Echeneformes Page 35</b>	
		No dorsal disc .. 37	
37	{	Dorsal and anal followed by 1 or more detached finlets .. <b>Scombroidei Page 76</b>	
		No detached finlets .. <b>Callionymoidei Page 74</b>	

### Order Clupeiformes

Fins without true spines; ventrals if present abdominal; maxillary entering gape to a greater or lesser extent.

1	{	Lateral line present .. 2	
		Lateral line absent .. 5	
2	{	Gular plate present between two sides of lower jaw .. 3	
		No gular plate .. 4	
3	{	Large pseudobranchiae; rays of dorsal not prolonged; scales small .. <b>Elops hawaiiensis</b>	
		Pseudobranchiae absent; last ray of dorsal produced; scales large .. <b>Megalops cyprinoides</b>	



4	{	Teeth absent ..	..	<b>Albula vulpes</b>
		Teeth present ..	..	<b>Chanos chanos</b>
5	{	No abdominal scutes ..	6	
		Keeled abdominal scutes ..	9	
6	{	Belly sharp ; canine teeth present; scales very small ..	8	
		Belly rounded ; no canine teeth ; scales moderate ..	7	
7	{	Maxillary with 2 supplemental bones, ; marine ..		<b>Dussumieria acuta</b>
		Maxillary with 1 supplemental bone ; estuarine ..		<b>Ehirava fluviatilis</b>
8	{	Gillrakers shorter than gill filaments ..		<b>Chirocentrus dorab</b>
		Gill rakers twice as long as gill filaments ..		<b>Chirocentrus nudus</b>
9	{	Mouth small and inferior ..		<b>Dorosoma nasus</b>
		Mouth large ..	10	
10	{	Pseudobranchiae absent ..	17	
		Pseudobranchiae present ..	11	
11	{	Scutes at least between pectorals and anal ; silvery hue missing only on back ..	12	
		Scutes only between pectorals and ventrals ; silvery hue limited to a lateral band ..	16	
12	{	Scutes from mouth to anus ..		<b>Engraulis baelama</b>
		Scutes only from pectorals to anus ..	13	
13	{	Maxillary short ; stops short of gill opening ..	14	
		Maxillary long ; reaches at least to pectorals ..	15	
14	{	Origin of anal distinctly behind end of dorsal gillrakers 27 ..		<b>Engraulis kammalensis</b>
		Origin of anal below or only slightly behind posterior base of dorsal ; gillrakers 13 ..		<b>Engraulis grayi</b>
15	{	Maxillary reaching base of pectorals ..		<b>Engraulis mystax</b>
		Maxillary reaching beyond pectorals ..		<b>Engraulis setirostris</b>

16	{	7 spiny abdominal scutes between pectorals and ventrals ..	<b>Stolephorus commersonii</b>
		4-5 spiny abdominal scutes between pectorals and ventrals ..	<b>Stolephorus indicus</b>
17	{	Anal fin moderate with 15-25 rays; ventrals well developed	18
		Anal fin long with more than 30 rays; ventrals small or absent	26
18	{	Origin of dorsal behind origin of ventrals; vomerine teeth present ..	<b>Clupeoides lile</b>
		Origin of dorsal before origin of ventrals; no vomerine teeth	19
19	{	Belly obtuse; no serrations behind ventrals ..	20
		Belly strongly compressed; post ventral edge serrated ..	22
20	{	14-15 post ventral abdominal scutes ..	20
		12 post ventral scutes; no longitudinal band with dark spots ..	<b>Clupea (Amblygaster) clupeoides</b>
21	{	Pearl coloured longitudinal band with series of dark spots present on each side of body ..	<b>Clupea (Amblygaster) leiogaster</b>
		No longitudinal band with spots	<b>Clupea (Amblygaster) sirm</b>
22	{	Teeth totally absent or present only in jaws; height of body about 1/3 or more of length	24
		Teeth absent or present in jaws, palate and tongue; height generally less than 1/3 of length	23
23	{	Caudal longer than head; no striae on head ..	<b>Clupea (Alosa) toli</b>
		Caudal not longer than head; post-ocular part of vertex striated ..	<b>Clupea (Alosa) kanagurta</b>
24	{	Height more than 1/3 length ..	<b>Clupea (Harengula) brachysoma</b>
		Height 1/3 to 1/4 length; lateral scales about 40; no teeth on tongue ..	<b>Clupea (Harengula) melanura</b>
		Height 1/3 to 1/4 length; lateral scales more than 40; teeth present on tongue ..	25
		Height 1/4 or less length ..	<b>Clupea (Harengula) longiceps</b>
25	{	Gillrakers more than 50; head length 3-4 times eye diameter	<b>Clupea (Harengula) fimbriata</b>
		Gillrakers less than 50 ..	<b>Clupea (Harengula) moluccensis</b>

- |    |   |   |                             |
|----|---|---|-----------------------------|
| 26 | { | Dorsal fin present ..                                   | 27                          |
|    |   | Dorsal fin absent ..                                    | <b>Opisthopterus tatoor</b> |
| 27 | { | Lateral scales 45 or less ; 23-28 abdominal scutes ..   | <b>Pellona ditchoa</b>      |
|    |   | More than 45 lateral scales ; 28-39 abdominal scutes .. | <b>Pellona elongata</b>     |

## Order Seopeliformes

### *FAMILY MYCTOPHIDAE*

Fins without true spines ; ventrals abdominal ; maxillary excluded from gape of mouth by intermaxillary.

- |   |   |   |                                       |
|---|---|---|---------------------------------------|
| 1 | { | Luminous organs present ..  | <b>Diaphus (Lamprossa) splendidus</b> |
|   |   | Luminous organs absent ..   | 2                                     |
| 2 | { | Two bands of teeth in each side of palate ; inner rays of ventrals not longer than outer .. | <b>Saurus myops</b>                   |
|   |   | One band of teeth ; inner rays of ventrals much longer than outer ..                        | <b>Saurida tumbil</b>                 |

## Order Cypriniformes

Ventrals when present abdominal ; pectoral fins low on sides of the body folding like ventrals.

- |   |   |                                     |
|---|---|-------------------------------------|
| { | Scales absent ; intermaxillary toothed ; pseudobranchiae absent 4-17 branchiostegals present .. | Suborder <b>Siluroidei</b> Page 22  |
|   | Scales present ; mouth toothed ; pseudobranchiae often present ; 3 branchiostegals ..           | Suborder <b>Cyprinoidei</b> Page 24 |

### Suborder SILUROIDEI

- |   |   |   |                                |
|---|---|---|--------------------------------|
| 1 | { | Dorsal spined ..                        | 5                              |
|   |   | Dorsal spineless ..                     | 2                              |
| 2 | { | Dorsal with more than 8 rays ..         | 3                              |
|   |   | Dorsal with 7 or 8 rays ..              | 4                              |
| 3 | { | 4 pairs of barbels present ..           | 5                              |
|   |   | 2 pairs of barbels ..                   | 6                              |
| 4 | { | Anal united with caudal ..              | <b>Heteropneustes mierops</b>  |
|   |   | Anal and caudal separated by a notch .. | <b>Heteropneustes fossilis</b> |

5	{	Distance from occipital process to snout $4\frac{1}{2}$ – $5\frac{1}{2}$ times distance between dorsal fin and occipital process .. ..	<b>Clarias batra</b>
		Distance from occipital process to snout $2\frac{1}{2}$ times distance between dorsal fin and occipital process .. ..	<b>Clarias teysi</b>
6	{	Mouth subterminal, extending to behind eye .. ..	<b>Wallago attu</b>
		Mouth superior, stopping before eye .. ..	<b>Ompok bimaculatus</b>
7	{	Caudal pointed and has a procurrent part .. ..	8
		Caudal forked, emarginate or truncate without a procurrent part .. ..	9
8	{	Nasal barbel extending beyond eye; 5 rows of mandibular teeth .. ..	<b>Plotosus canius</b>
		Nasal barbel not extending beyond eye; 2 or 3 rows of mandibular teeth .. ..	<b>Plotosus anguillaris</b>
9	{	Anterior and posterior opening of each nostril close together; no nasal barbel present .. ..	12
		Openings to nostrils far apart, the posterior with a nasal barbel .. ..	10
10	{	2 distinct cephalic fontanel .. ..	11
		1 cephalic fontanel .. ..	<b>Mystus gulio</b>
11	{	Fontanel equal .. ..	<b>Mystus keletius</b>
		Posterior fontanel smaller than anterior .. ..	<b>Mystus vittatus</b>
12	{	Maxillary and mandibular barbels present .. ..	14
		Mandibular barbels absent .. ..	13
13	{	Upper surface of head smooth; barbel longer than head .. ..	<b>Osteogeneiosus militaris</b>
		Upper surface of head with a few granulations; barbels as long as head .. ..	<b>Osteogeneiosus stenocephalus</b>

14	{	Barbel present between anterior and posterior openings to nostril ..	<b>Arius tenuispinis</b>
		No barbel between anterior and posterior openings to nostril..	15
15	{	Vomerine teeth form a continuous band confluent with palatine teeth ..	<b>Tachysurus (Netuna) thalassinus</b>
		Teeth on palate in two widely separated patches ..	16
16	{	Teeth on palate villiform ..	17
		Teeth on palate granular or obtusely conical ..	18
17	{	Anal rays 13 ..	<b>Tachysurus (Tachysurus) caelatus</b>
		Anal rays 18-19 ..	<b>Arius venosus</b>
18	{	Teeth on palate in 4 groups ..	<b>Arius dussumieri</b>
		Teeth on palate in 2 groups ..	<b>Tachysurus (Pseudarius) falcaarius</b>

#### Suborder CYPRINOIDEI

1	{	Mouth inferior with 6, 8 or more barbels; simple moveable spine near eye ..	2
		Mouth anterior or inferior, never more than 4 barbels ..	5
2	{	Erectile spine in front of or below eye ..	<b>Lepidocephalus thermalis</b>
		No such spine ..	3
3	{	Scales on body ..	4
		Scales wanting ..	<b>Nemacheilus notostigma</b>
4	{	Pectoral extending to base of ventral; base of dorsal as long as pectoral fin ..	<b>Nemacheilus botia botia</b>
		Pectoral does not extend to ventral; base of dorsal shorter than pectoral fin ..	<b>Nemacheilus botia aureus</b>
5	{	At least part of abdomen compressed into an edge ..	<b>Laubuca (Laubuca) laubuca</b>
		Abdomen not compressed but rounded or flattened ..	6
6	{	Lateral line in middle of tail ..	12
		Lateral line if present close to ventral edge ..	7
7	{	Barbels absent ..	8
		Barbels present ..	11
8	{	Lateral line present ..	9
		Lateral line absent ..	<b>Horadandiya atukorali</b>

9	{ Predorsal scales 28-30 ..	<b>Amblypharyngodon melettinus</b>
	{ Predorsal scales 11-17 ..	10
10	{ Lateral line complete ..	<b>Rasbora daniconius</b>
	{ Lateral line incomplete ..	<b>Rasbora vaterifloris</b>
11	{ Symphyisial knob present, 13-16 ..	<b>Danio (Danio) malabaricus</b>
	{ anal rays ..	<b>Esomus danrica thermoicos</b>
	{ No symphyisial knob, 5 anal rays ..	
12	{ Mouth terminal or sub-terminal ..	17
	{ Mouth inferior ..	13
13	{ Chin with disc ..	14
	{ Chin without disc ..	15
14	{ Ventral median groove present in ..	<b>Garra ceylonensis ceylonensis</b>
	{ rostral fold ..	<b>Garra ceylonensis phillipsi</b>
	{ No ventral median groove ..	
15	{ Lateral rostral lobes present ..	16
	{ Lateral rostral lobes absent ..	<b>Labeo dussumieri</b>
16	{ Origin of dorsal in midback ..	<b>Labeo fisheri</b>
	{ Origin of dorsal closer to tip of ..	<b>Labeo porcellus lankae</b>
	{ snout than to caudal ..	
17	{ Post labial groove interrupted in ..	18
	{ middle of lower jaw ..	<b>Tor Khudree longispinis</b>
	{ Post labial groove continuous ..	
18	{ Dorsal with 19-21 rays ..	19
	{ Dorsal with 7-9 rays ..	20
19	{ Barbels absent ..	<b>Carassius vulgaris</b>
	{ 4 Barbels present ..	<b>Cyprinus carpio</b>
20	{ Lateral line complete ..	24
	{ Lateral line incomplete ..	21
21	{ Dorsal spine smooth ; coloured ..	<b>Puntius vittatus</b>
	{ band on dorsal ..	22
	{ Dorsal spine serrated ..	
22	{ Barbels absent ..	23
	{ Barbels present ..	<b>Puntius titteya</b>
23	{ Two transverse bands on body ..	<b>Puntius cumingi</b>
	{ Spot on shoulder, and caudal ..	<b>Puntius ticto</b>
	{ peduncle ..	
24	{ Dorsal spine smooth ..	27
	{ Dorsal spine serrated ..	25
25	{ Barbels absent ; 3 transverse ..	<b>Puntius nigrofasciatus</b>
	{ bands on body ..	
	{ Rostral and maxillary barbels ..	26
	{ present ..	

26	{	Longitudinal band from eye to caudal ..	<b>Puntius pleurotaenia</b>
		Spot on caudal peduncle ..	<b>Puntius sarana</b>
27	{	Barbels absent, 3 bands across body ..	<b>Puntius melanampyx sinhala</b>
		Maxillary barbels present ..	28
28	{	Dorsal spine strong, $4\frac{1}{2}$ scales above lateral line and $2\frac{1}{2}$ below ..	<b>Puntius dorsalis</b>
		Dorsal spine slender ..	29
29	{	Spot over base of anal ..	<b>Puntius filamentosus</b>
		No spot or if present behind base of anal ..	30
30	{	$5\frac{1}{2}$ scales above lateral line and $3\frac{1}{2}$ below ..	<b>Puntius chola</b>
		$4\frac{1}{2}$ scales above lateral line and $2\frac{1}{2}$ below ..	<b>Puntius amphibius</b>
		$3\frac{1}{2}$ scales above lateral line and $2\frac{1}{2}$ – $3\frac{1}{2}$ below ..	<b>Puntius bimaculatus</b>

### Order Anguilliformes

Body ribbon shaped; mouth bordered by maxillaries; scales if present small. Ventral fin absent—

1	{	Tongue present ..	2
		Tongue and pectorals absent ..	21
2	{	Scales present ..	3
		Scales absent ..	4
3	{	Anterior end of dorsal only just above anterior end of anal ..	<b>Anguilla australis</b>
		Anterior end of dorsal before anterior end of anal by a distance equivalent to more than half length of head ..	<b>Anguilla eiphinstonei</b>
4	{	Posterior openings of nostrils on top of head ..	5
		Posterior nares open as slits in upper lip ..	9
5	{	Dorsal and anal confluent with caudal fin ..	6
		Dorsal and anal distinct from caudal ..	<b>Rataboura bicolor</b>

6	{	Tongue free ; the etclose set on jaws ..	7	
		Tongue adnate ; anterior vomerine teeth conical ..	8	
7	{	Teeth subequal, outer teeth close set to form a cutting edge ..		<b>Conger cinereus</b>
		Teeth unequal, outer teeth not forming a cutting edge ..		<b>Ariosoma anago</b>
8	{	Branchial openings in pharynx wide slits ..		<b>Muraenesox cinereus</b>
		Branchial openings are narrow slits ..		<b>Muraena (Gymnothorax) rupelli</b>
9	{	Caudal fin present ..	10	
		Caudal fin absent ..	11	
10	{	Origin of dorsal anterior to vent ..		<b>Muraenichthys gymnopterus</b>
		Origin of dorsal posterior to vent ..		<b>Muraenichthys vermiformis</b>
11	{	Origin of dorsal before gill opening ..	12	
		Origin of dorsal above or behind gill opening ..	13	
12	{	Snout 1.8 times diameter of eye ; no teeth on intermaxillary plate ..		<b>Sphagebranchus longipinnis</b>
		Snout 3 times diameter of eye ; teeth on intermaxillary plate ..		<b>Callechelys kirki</b>
13	{	Teeth in one series in jaws. Upper lip with fringe of papillae ..		<b>Braehysomophis (Braehysomophis) cirrhoceilus</b>
		Teeth in more than one series in jaws ; no fringe on lip ..	14	
14	{	No teeth on vomer ..		<b>Leiuranus semicinctus</b>
		Teeth on vomer ..	15	
15	{	Pectorals present ..	18	
		Pectorals absent ..	16	
16	{	Head 8-10 times in body length ..	17	
		Head about 17 times in body length ..		<b>Sphagebranchus lumbricoides</b>
17	{	Origin of dorsal behind gill opening by a distance equivalent to $\frac{1}{4}$ of head length ..		<b>Sphagebranchus polyopthalmus</b>
		Origin of dorsal immediately behind gill opening ..		<b>Sphagebranchus orientalis</b>
18	{	Teeth granular ..		<b>Pisoodonophis cancrivorous</b>
		Teeth conical ..	19	



19	{	Maxillary teeth uniserial ..	20	
		Maxillary teeth in a double series, the inner of which may be incomplete ..		<b>Ophichthys rhytidodermatoides</b>
20	{	Origin of dorsal behind base of pectoral ..		<b>Ophichthys apicalis</b>
		Origin of dorsal above gill openings ..		<b>Ophichthys altipinnis</b>
21	{	No bony sub-dermal scutes on tail ..	22	
		Bony sub dermal scutes on tail ..		<b>Arndha zebra</b>
22	{	Some teeth blunt ..	23	
		All teeth fang like ..	24	
23	{	White with 2-3 rows of stellate blotches ..		<b>Echidna nebulosa</b>
		Pale yellow with fine brown mottling ..		<b>Echidna delicatula</b>
24	{	Lateral line present ..		<b>Thysoidea macrura</b>
		Lateral line absent ..	25	
25	{	Dorsal and anal fins present ..	26	
		Dorsal and anal fins absent ..		<b>Gymnomuraena concolor</b>
26	{	Length more than 30 times height ..	27	
		Length less than 35 times height ..		<b>Pseudoechidna brummeri</b>
27	{	Mesial teeth on intermaxillary plate conical ..		<b>Gymnothorax pictus</b>
		Mesial teeth on intermaxillary plate depressible, more or less slender fangs ..	28	
28	{	Maxillary teeth in 2 or 3 series, the inner one having at least 5 teeth ..	29	
		Maxillary teeth in 1 series only or in two series, the anterior being composed of 1-4 fang like ones which disappear with age ..	30	
29	{	Head $3\frac{1}{2}$ times length of cleft of mouth ; body length 4.5 times head ..		<b>Gymnothorax polyuranodon</b>
		Head more than $3\frac{1}{2}$ times length of cleft of mouth ; body 3 or less times length of head ..		<b>Gymnothorax punctatus</b>
30	{	Head, trunk and tail with dark spots arranged in rows ..		<b>Gymnothorax undulatus fimbriatus</b>
		Head, trunk and tail marbled or reticulated ..	31	
		Head, trunk and tail uniform brown ..		<b>Gymnothorax boschi</b>

31	{	Body 2.0 to 2.6 times as long as head ..	<b>Gymnothorax undulatus undulatus</b>
		Body length 3 times as long as head ..	<b>Gymnothorax favagineus</b>

### Order Symbranchiformes

Body band shaped; lateral line present; pectorals absent; dorsal and anal reduced to rayless folds of skin and united with small caudal which has few rays; gill openings confluent.

One genus and species .. **Synbranchus bengalensis**

### Order Halosauriformes

Elongate body with tail tapering to a point; lateral line present; operculum well developed; ventrals abdominal; anal long; pectorals high up on sides; mouth small and inferior.

One genus and species .. **Halosauropsis affinis**

### Order Syngnathiformes

Head produced into a tube like snout with terminal mouth; body naked or with small scales; a spinous dorsal and soft dorsal present, or exceptionally both may be absent; ventrals when present are abdominal; if caudal fin is absent, the tail is prehensile.

1	{	Mouth toothed ..	2
		Mouth toothless ..	3
2	{	2 dorsals; vent far behind ventrals	<b>Aluostoma chinensis</b>
		Only soft dorsal present; vent close to ventrals ..	<b>Fistularia petimba</b>
3	{	Only 1 dorsal fin or none at all; ventrals absent ..	5
		Two dorsal fins; ventrals present	4
4	{	Ventrals rudimentary, 4 branchiostegals ..	<b>Centriseus scutatus</b>
		Ventrals large with 1 spine and 6 rays, 1 branchiostegal ..	<b>Solenostomus paradoxus</b>
5	{	Caudal fin present ..	6
		Caudal fin absent ..	<b>Hippocampus kuda</b>

6	{	Basal opercular keel rectilinear ; base of dorsal not elevated ..	7	
		Basal opercular keel upwardly convex with radial lines ; base of dorsal elevated ..		<b>Trachyrhamphus serratus</b>
7	{	Egg pouch abdominal ..	8	
		Egg pouch subcaudal ..	9	
8	{	Vent in posterior half of body ; snout longer than rest of head		<b>Microphis brachyurus</b>
		Vent in anterior half of body ; snout shorter or only slightly longer than rest of head ..		<b>Dorichthys ocellatus</b>
9	{	Base of dorsal elevated ..		<b>Syngnathus longirostris</b>
		Base of dorsal not elevated ..		<b>Syngnathus djarong</b>

### Order Beloniformes

Lateral line and scales present, often with a row forming a caudal keel ; ventrals abdominal and 6 rayed ; dorsal far back, opposite anal ; branchiostegals 9-15.

1	{	Scales small ; both jaws pro- duced and beak-like ; mouth large ..	2	
		Scales large or moderate ; jaws not beak-like or if beak-like only lower jaw produced ; mouth small ..	7	
2	{	Caudal peduncle strongly de- pressed and keeled ..		<b>Belone cancellia</b>
		Caudal peduncle compressed or only slightly depressed ..	3	
3	{	Dorsal originates behind anal ..	4	
		Dorsal originates opposite anal ..		<b>Xenentodon cancellia</b>
4	{	Height less than twice breadth of body ..	5	
		Height twice the breadth of body		<b>Athlennes hians</b>
5	{	Caudal truncate or rounded ..	6	
		Caudal forked ..		<b>Tylosurus crocodilus</b>
6	{	Caudal rounded ..		<b>Tylosurus strongylurus</b>
		Caudal subtruncate ..		<b>Tylosurus leiurus</b>
7	{	Lower jaw beak-like ..	8	
		Lower jaw not beak-like ..		<b>Exocoetus volitans</b>
8	{	Caudal forked ..	9	
		Caudal truncate or rounded ..		<b>Zenarchopterus dispar</b>

9	{	Base of ventrals midway between eye and base of caudal ..	10	
		Base of ventrals nearer to caudal than to head ..		<b>Hemirhamphus marginatus</b>
10	{	Beak red tipped, body 7-7½ length of beak ..		<b>Hemirhamphus xanthopterus</b>
		Body more than 7 times beak length ..		<b>Hemirhamphus gaimardi</b>

### Order Mugiliformes & Polynemiformes

Ventral fin with a spine and 5 rays, abdominal in position ; 2 dorsal fins, 5-7 branchiostegals.

1	{	Pectorals low down with detached filaments ..	2	
		Pectorals normal without filaments ..	7	
2	{	Lower lip developed only at corner of mouth ; 3-4 pectoral filaments ..		<b>Eleutheronema tetradactylum</b>
		Lower lip well developed ; 5 or more filaments ..	3	
3	{	5 free pectoral filaments ..	4	
		6-7 free pectoral filaments ..	5	
4	{	All pectoral rays unbranched : lateral scales 60-65 ..		<b>Polynemus plebejus</b>
		All but 2 or 3 pectoral rays are unbranched ; lateral scales 70-75 ..		<b>Polynemus indicus</b>
5	{	Six pectoral filaments ..	6	
		Seven pectoral filaments ..		<b>Polynemus heptadactylus</b>
6	{	Pectoral rays unbranched ; teeth on vomer ..		<b>Polynemus sexfillis</b>
		Pectoral rays mostly branched ; no teeth on vomer ..		<b>Polynemus sextarius</b>
7	{	Lateral line well developed. Teeth fang like ; mouth wide ..	8	
		Lateral line absent or rudimentary ; teeth small ; mouth small ..	11	
8	{	Angle of preoperculum rounded ..	9	
		Angle of preoperculum square ..	10	
9	{	Lateral scales 110-130 ..		<b>Sphyraena jello</b>
		Lateral scales 80 ..		<b>Sphyraena picuda</b>

10	{	Length about 6 times height ..	<b>Sphyraena obtusata</b>
		Length 6.7-7 times in height ..	<b>Sphyraena langsar</b>
		Length about 8 times height ..	<b>Sphyraena brachygnathus</b>
11	{	First dorsal with 4 spines ; anal 3 spines ..	13
		First dorsal with 5 spines ; anal 1 spine ..	12
12	{	Lateral scales 35-40 ; vent opposite 9th-10th scale from operculum ..	<b>Atherina duodecimalis</b>
		Lateral scales 42-45 ; vent oppo- site 12th-14th scale ..	<b>Atherina forskali</b>
13	{	Gelatinous eyelid well developed covering at least a third of its eye posteriorly ..	14
		Gelatinous eyelid very small or wanting ..	17
14	{	Lateral scales 28-31 ..	<b>Mugil dussumieri</b>
		Lateral scales 33-35 ..	15
		Lateral scales over 40 ..	<b>Mugil cunnesius</b>
15	{	Maxillary visible ; head length $1\frac{2}{3}$ -2 times least height of caudal peduncle ...	<b>Mugil tade</b>
		Maxillary hidden when mouth closed ; head length more than twice least height of caudal peduncle ..	16
16	{	Pectorals much shorter than head ; height of caudal pe- duncle about $\frac{2}{5}$ length of head ..	<b>Mugil kelaarti</b>
		Pectorals about same length, as head ; height of caudal pe- duncle about half in length of head ..	<b>Mugil longimanus</b>
17	{	Anal with 8 soft rays ..	<b>Mugil vaigiensis</b>
		Anal with 9 soft rays ..	18
18	{	Snout pointed ; pectoral with axillary scale ..	<b>Mugil ceramensis</b>
		Snout blunt ; pectoral without axillary scale ..	19
19	{	Origin of second dorsal opposite lateral scale 21-23 ..	<b>Mugil troscheli</b>
		Origin of second dorsal opposite lateral scale 20 ..	<b>Mugil cephalus</b>

### Order Ophiocephaliformes

Body elongate and cylindrical or oblong and compressed ; scales large or moderate ; single long dorsal fin ; ventrals may be thoracic, subabdominal or absent ; pseudobranchiae rudimentary or wanting ; gills 4.

1	{	Fins spineless ; ventrals when present with 6 rays ..	2	
		Dorsal and anal spined ; ventrals with 5 or less rays and 1 spine ..	6	
2	{	Ventrals absent ..	3	<b>Channa orientalis</b>
		Ventrals present ..		
3	{	Cephalic sense pits multiple, sieve like ..	4	
		Cephalic sense pits single ..	5	
4	{	6 transverse rows of scales on top of head before level of opercles ..		<b>Ophicephalus marulius ara</b>
		10 transverse rows of scales on top of head before level of opercles ..		<b>Ophicephalus striatus</b>
5	{	Dorsal rays 29-30 ..		<b>Ophicephalus punctatus</b>
		Dorsal rays 31-35 ..		<b>Ophicephalus gachua</b>
6	{	Outer ray of ventral bifid ..	7	
		Outer ray of ventral a single elongate filament ..	8	
		All fins filamentous except pectorals ..		<b>Malpulutta kretseri</b>
7	{	Ventral without elongate ray ..		<b>Anabas testudineus</b>
		Outer ray of ventral elongated ..		<b>Belontia signata</b>
8	{	Lateral line complete ..		<b>Osphronemus goramy</b>
		Lateral line rudimentary or incomplete ..	9	
9	{	Dorsal longer than anal ..		<b>Trichogaster pectoralis</b>
		Dorsal shorter than anal ..		<b>Macropodus cupanus</b>

### Order Cyprinodontiformes

Small fish without a lateral line ; fins without spines. Ventrals abdominal ; dorsal fin back above anal ; mouth small ; branchiostegals 4-7.

1	{	Anal 20-24 rays ; no teeth on vomer ..	<b>Aplochilus melastigma</b>
		Anal 15-17 rays ; teeth on vomer ..	2
2	{	Body with transverse stripes ..	<b>Panchax lineatus</b>
		No stripes on body ..	<b>Panchax panchax</b>

## Order Pleuronectiformes

Body strongly compressed and flattened; one side of the body is pigmented and containing both eyes; other side is unpigmented or nearly so; teeth if present small; Lateral lines may be single, double, triple or absent, pseudobranchiae well developed; long dorsal and anal fin present.

1	{	Origin of dorsal posterior to head; anterior dorsal rays spinous ..	..	<b>Psettodes erumei</b>
		Dorsal beginning on head; no dorsal or ventral spines ..	..	2
2	{	First few rays of dorsal produced; usually as long as the entire base length of the dorsal ..	..	<b>Samaris cristatus</b>
		First few rays of dorsal not produced ..	..	3
3	{	Mouth terminal and large ..	..	4
		Mouth not terminal but small ..	..	8
4	{	Two ventrals about equal ..	..	5
		Ventrals unequal ..	..	6
5	{	Dark ocelli arranged as if they were the apices of triangle, the posterior one being on the lateral line ..	..	<b>Pseudorhombus triocellatus</b>
		Single dark blotch on lateral line just behind its curve ..	..	<b>Pseudorhombus javanicus</b>
6	{	Lateral scales more than 75 ..	..	7
		Lateral scales fewer than 75 ..	..	<b>Bothus (Arnoglossus) tapeinosoma</b>
7	{	Eyes very close together ..	..	<b>Bothus (Platophrys) polyophthalmus</b>
		Eyes well separated ..	..	<b>Bothus (Platophrys) pantherinus</b>
8	{	Caudal separated from dorsal and anal ..	..	<b>Solea elongata</b>
		Caudal united with dorsal and anal ..	..	9
9	{	Pectorals present; eyes on right side of body ..	..	10
		Pectorals present; eyes on left side of body ..	..	11
10	{	Eyes close together ..	..	<b>Synaptura quagga</b>
		Eyes separated ..	..	<b>Synaptura orientalis</b>
11	{	Lips of coloured side with fringed tentacles ..	..	<b>Paraplagusia bilineata</b>
		Lips not fringed ..	..	12

12	{	Lateral scales fewer than 70 ..	13
		Lateral scales more than 85 ..	14
13	{	Head length 15 times diameter of eye ..	<b>Cynoglossus cynoglossus</b>
		Head length 8-10 times diameter of eye ..	<b>Cynoglossus puncticeps</b>
14	{	6-7 rows of scales between 2 branches of lateral line ..	<b>Cynoglossus macrolepidotus</b>
		8-9 rows of scales between branches of lateral line ..	<b>Cynoglossus oligolepis</b>

### Order Beryciformes

Body oblong or rather elevated and compressed ; 4-9 branchiostegals ; head with mucous cavities ; lateral line present ; maxillaries fairly large ; pseudobranchiae present ; eyes large ; teeth on jaws and palate ; anterior rays of dorsal and anal spinous ; 1 or 2 dorsals ; cleft of mouth oblique.

1	{	Dorsal with fewer than 9 spines ..	<b>Monocentris japonicus</b>
		Dorsal with 10 or more spines ..	2
2	{	A long spine at edge of preoperculum ..	3
		No such long spine ..	5
3	{	4 rows of scales between spinous dorsal and lateral line ..	<b>Holocentrum spiniferum</b>
		3 rows of scales ..	4
4	{	Lateral scales 46-51 ..	<b>Holocentrum diadema</b>
		Lateral scales 33-44 ..	<b>Holocentrum rubrum</b>
5	{	Lateral scales 36-40 ..	<b>Myripristis pralinus</b>
		Lateral scales 28-32 ..	<b>Myripristis murdjan</b>

### Order Echeneformes

Body elongate and fusiform ; first dorsal forms an adhesive organ ; teeth villiform and present on jaws, palate and tongue ; second dorsal and anal long ; ventrals thoracic ; scales small

{	Anal rays 21-23 ..	<b>Echeneis scutata</b>
	Anal rays 24-25 ..	<b>Echeneis remora</b>
	Anal rays 32-38 ..	<b>Echeneis naucrates</b>



## Order Cottiformes

Spiny rayed fishes ; ventrals if present, thoracic or jugular in position and composed of 1 spine and 5 rays.

2 Super families with 3 families.

### Super family Platycephaloidea

#### *Family PLATYCEPHALIDAE*

Body oblong and compressed ; two, separate dorsal fins ; ventrals thoracic ; 5-7 branchiostegals ; pseudobranchiae present ; cleft of mouth horizontal.

- |   |   |   |                                   |
|---|---|---|-----------------------------------|
| 1 | { | Lateral line armed with spines ..           | 2                                 |
|   |   | Lateral line smooth ..                      | 3                                 |
| 2 | { | Lateral scales 53-55 ..                     | <b>Platycephalus tuberculatus</b> |
|   |   | Lateral scales 75 ..                        | <b>Platycephalus macracanthus</b> |
| 3 | { | Ridges on head with spines ..               | <b>Platycephalus insidiator</b>   |
|   |   | No spines on ridges of head but serrated .. | <b>Platycephalus serratus</b>     |

### Super family Scorpaenoidea

#### *Family TRIGLIDAE*

Body covered by bony plates ; teeth absent ; lacrymals produced into a rostral process.

- |   |   |                                |
|---|---|--------------------------------|
| { | Branchiostegals 7 ; dorsal of two portions .. | <b>Peristedion pothumaluva</b> |
|   | Branchiostegals 6 ; dorsal continuous ..      | <b>Aneme inerme</b>            |

#### *Family SCORPAENIDAE*

Body oblong and compressed ; ventrals thoracic ; dorsal uninterrupted but with spinous and soft rayed portions ; 5-6 branchiostegals ; pseudobranchiae present.

- |   |   |                                       |                             |
|---|---|---------------------------------------|-----------------------------|
| 1 | { | Scales rudimentary or absent ..       | 2                           |
|   |   | Scales present ..                     | 3                           |
| 2 | { | Teeth on jaws, only ..                | <b>Micropus zeylonicus</b>  |
|   |   | Teeth on jaws, vomer and palatine ..  | <b>Gymnapistus dracaena</b> |
| 3 | { | Teeth on jaws, vomer and palatines .. | <b>Peloropsis frondosus</b> |
|   |   | Teeth only on jaws and vomer ..       | 4                           |

4	{	Fleshy appendages on head and body ..	5
		Fleshy appendages on head only ..	6
5	{	Orbital tentacle present ..	<b>Scorpaenopsis rosea</b>
		Orbital tentacle absent ..	<b>Scorpaenopsis guamensis</b>
6	{	Scales between eyes short; tentacle above eye ..	<b>Pterois miles</b>
		No scales between eyes; long tentacle above eye ..	7
7	{	Pectoral 17 rayed reaching base of caudal ..	<b>Pterois zebra</b>
		Pectoral 14 rayed reaching to or beyond base of caudal ..	<b>Pterois volitans</b>

## Order Lophiiformes

First ray of spinous dorsal, if present, placed on head and transformed into an "illicium"; ventrals if present jugular in position consisting of 1 spine and 5 rays; pectorals with short arms.

### *Family ANTENNARIDAE*

Compressed and misshapen body; scales absent; teeth small; anterior spines of dorsal separate; the first on the snout is slender, movable and with a fringed apex, the second and third are enveloped in thick skin.

1	{	Skin rough ..	2
		Skin smooth ..	<b>Antennarius marmoratus</b>
2	{	First spine a simple flap ..	3
		First spine divided at tip into 3 long flaps ..	<b>Antennarius pinniceps</b>
3	{	Dorsal with 13-14 rays in addition to first 3 spines ..	<b>Antennarius commersoni</b>
		Dorsal with 12 rays in addition to first 3 spines ..	4
4	{	Single black band on caudal and anal ..	<b>Antennarius biggubus</b>
		Bands variable if present but never single ..	<b>Antennarius hispidus</b>

## Order Batrachoidiformes

Robust body with broad depressed head; scales virtually absent; mouth large with curved canines on jaws and palate; spines on opercle; 2 dorsals; ventrals jugular with 1 spine and 2 or 3 rays.

Single genus and species .. **Batrachus grunniens**

## Order Mastocembeliformes

Elongated eel like body; dorsal fin long and single, anterior portion consisting of free spines; 3 spines anterior to anal; ventrals absent; branchiostegals 6; pseudobranchiae absent.

{	Preorbital spine present ..	<b>Macragnathus aculeatus</b>
	Preorbital spine absent ..	<b>Mastacembelus armatus</b>

## Order\*

### *Family CICHLIDAE*

Body oblong and compressed; teeth in jaws small, none on palate; dorsal fin single, spinous portion longer than soft-rayed portion; ventrals thoracic; lateral line interrupted; branchiostegals 5-6; pseudobranchiae absent.

1 {	Under 30 lateral scales ..	<b>Tilapia mossambica</b>
	Over 30 lateral scales ..	2
2 {	1-3 dark blotches along sides ..	<b>Etroplus maculatus</b>
	8 vertical dark bands ..	<b>Etroplus suratensis</b>

## Order Gobiformes

(Suborder Gobiodei of the Order Perciformes of Berg)

Body generally elongated; pseudobranchiae present or rudimentary; single dorsal fin which may be divided or not; lateral line absent.

1 {	Ventral fins united ..	2
	Ventrals separate ..	17

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(The family Cichlidae is placed in the superfamily Percoidae, sub-order Percoidei of the order Perciformes by Berg).

2	{	Teeth of lower jaw in more than one row .. .. 6	
		Teeth of lower jaw in single row .. .. 3	
3	{	Second dorsal elongate .. 4	
		Second dorsal not elongate .. 5	
4	{	Lateral scales more than 200 .. <b>Pseudapoeryptes lanceolatus</b>	
		Lateral scales fewer than 150 .. <b>Parapoeryptes macrolepis</b>	
5	{	A free lower eye lid present; in profile eye is prominent above head .. .. <b>Periophthalmus koelreuteri</b>	
		No free lower eye lid; not prominent above head in profile.. <b>Sicyopterus gymnauchen</b>	
6	{	Shape of body oval and strongly compressed .. <b>Paragobiodin echinocephalus</b>	
		Body elongated .. 7	
7	{	Head naked above and behind eyes .. .. 8	
		Head scaled above and behind eyes .. .. 9	
8	{	Caudal longer than head .. <b>Oligolepis acutipinnis</b>	
		Caudal shorter than head .. <b>Zonogobius semidolatus</b>	
9	{	First ray of each of the two dorsals strong and bony .. <b>Oplopomus oplopomus</b>	
		First ray not strong and spiny.. 10	
10	{	Caudal longer than head .. 17	
		Caudal shorter than head .. 11	
11	{	Upper jaw more prominent than lower .. .. <b>Awaous grammepomus</b>	
		Lower jaw more prominent than upper .. .. 12	
12	{	Lateral scales more than 36 .. <b>Bathygobius fuscus</b>	
		Later scales 36 or fewer .. 13	
13	{	Gill opening continued forward on ventral side; isthmus narrow.. 14	
		Gill opening not continued forward on the ventral side; isthmus broad 15	
14	{	7-9 rows of scales on each side of body; 2 ocelli on the first dorsal <b>Glossogobius biocellatus</b>	
		9-14 rows of scales on each side of body .. .. <b>Glossogobius giuris</b>	

15	{	Predorsal scales fewer than 10 ..	<b>Stigmatogobius sadanundio</b>
		Predorsal scales 10 or more ..	16
16	{	Lateral scales 30-32; and pre-dorsal scales 17-20 ..	<b>Acentrogobius canius</b>
		Lateral scales 26-28; predorsal scales 10-12 ..	<b>Acentrogobius ornatus</b>
17	{	Vomer with teeth ..	<b>Bostrichthys sinensis</b>
		Vomer without teeth ..	18
18	{	Spines on preopercle ..	19
		No spines on preopercle ..	20
19	{	Lateral scales fewer than 28 ..	<b>Asterropteryx semi-punctatus</b>
		Lateral scales over 40 ..	<b>Eleotris fusca</b>
20	{	Bony crests between eyes ..	21
		No bony crests between eyes ..	22
21	{	Predorsal scales more than 18 ..	<b>Butis butis</b>
		Predorsal scales fewer than 16 ..	<b>Prionobutis kollomatodon</b>
22	{	Teeth in upper jaw in one row; body elongate; head compressed	23
		Teeth in upper jaw in several rows. Head not compressed ..	24
23	{	25 scales in transverse series; cheek, opercle and dorsal fins with red longitudinal stripes	<b>Eleotriodes muralis</b> ,
		22-23 scales in transverse series; cheek with 2-3 rows of blue spots ..	<b>Eleotriodes sexguttata</b>
24	{	Lateral scales fewer than 40 ..	<b>Ophiocara porocephala</b>
		Lateral scales more than 40 ..	<b>Eleotris canarensis</b>

## Order Tetradontiformes

### Suborder BALISTOIDEI AND OSTRACIOIDEI

Body encased in heavy armour of enlarged bony scales or hexagonal bony plates; elements of spinous dorsal and ventral variously modified or no spines at all; teeth not united.

1	{	Spinous dorsal wanting ..	2
		Spinous dorsal present ..	6
2	{	Carapace with 3 ridges ..	<b>Ostracion turritus</b>
		Carapace with 4-5 ridges ..	3

3	{ Spines on carapace ..	<b>Ostracion cornutus</b>
	{ Spineless carapace ..	4
	{ Median dorsal ridge present ..	<b>Ostracion nasus</b>
	{ Median dorsal ridge absent ..	5
5	{ Ocelli with blue-black edges on most scutes ..	<b>Ostracion cubicus</b>
	{ Numerous white dots sometimes confluent into lines ..	<b>Ostracion punctatus</b>
6	{ Spinous dorsal 1-3 spines ..	8
	{ Spinous dorsal 4-6 spines ..	7
7	{ Second and third dorsal spines equal in length ..	<b>Triacanthus brevirostris</b>
	{ Second spine thrice the length of the third ..	<b>Triacanthus strigilifer</b>
8	{ Dorsal spines 3 ..	9
	{ Dorsal spines 1 or 2 ..	15
9	{ Free portion of tail depressed ..	<b>Balistes stellatus</b>
	{ Free portion of tail compressed ..	10
10	{ Spines on side of tail ..	11
	{ No spines on tail ..	13
11	{ A groove before eye ..	<b>Balistes viridescens</b>
	{ No groove ..	12
12	{ Third dorsal spine minute ..	<b>Balistapus aculeatus</b>
	{ Third dorsal spine moderate ..	<b>Balistes undulatus</b>
13	{ Caudal lobes elongate ..	<b>Balistes erythron</b>
	{ Caudal lobes not elongate ..	14
14	{ Dull yellow with vertical brown stripes and spots ..	<b>Balistes fuscus</b>
	{ Dull yellowish without vertical brown stripes and spots ..	<b>Balistes mitis</b>
15	{ Dorsal spine with 2 rows of barbs ..	16
	{ Dorsal spine rough but barbless ..	17
16	{ Fleshy appendages over body ..	<b>Monacanthus chirocephalus</b>
	{ No fleshy appendages ..	<b>Monacanthus setifer</b>
17	{ Upper profile of mouth convex ..	<b>Monacanthus monoceros</b>
	{ Upper profile of mouth concave ..	<b>Monacanthus scriptus</b>

### Suborder TETRODONTOIDEI

Teeth in each jaw fused into 1 unit without suture in front; body covered with spines; inflatable into a ball; when inflated the dorsal and anal often completely withdrawn.

1	{	Teeth in each jaw fused to 1 unit	..	2	<b>Diodon hystrix</b>
		Teeth fused but have a distinct suture in front	..	3	
2	{	Lateral line present	..	3	<b>Canthigaster margaritatus</b>
		No lateral line	..	4	
3	{	Two openings to each nostril in separate cavities	..	9	
		Nostril openings in a single cavity or as 2 solid tentacles..	..	4	
4	{	Raised fold of skin along tail and body	..	5	<b>Amblyrhynchotes hypselogenion</b>
		No raised fold of skin along tail	..	6	
5	{	Caudal lunate	..	6	<b>Torquingener oblongus</b>
		Caudal truncate or rounded	..	7	
6	{	No spines on back	..	7	
		Spines on back	..	8	
7	{	Dorsal rays 12; body smooth	..	7	<b>Lagocephalus inermis</b>
		Dorsal rays 13-14; spines on belly from snout to vent	..	8	<b>Lagocephalus lagocephalus</b>
8	{	Body spotted	..	7	<b>Gastrophysus sceleratus</b>
		Body not spotted	..	8	<b>Gastrophysus lunaris</b>
9	{	Margins of caudal dark	..	7	<b>Arothron immaculatus</b>
		Black spots on body	..	8	<b>Arothron nigropunctatus</b>
		Greenish brown, with light spots on back	..	9	<b>Arothron hispidus</b>

### Order PERCIFORMES

Fins usually with spines; maxillary quite excluded from gape of mouth; premaxillary distinct; usually two dorsal fins, the first spinous and second soft rayed; often confluent, or separate, not widely so; ventral fins with not more than 6 rays usually thoracic but sometimes jugular or somewhat behind pectorals; caudal fin with not more than 17 principal rays. Eyes and skull symmetrical; 9 suborders.

Suborder I      *Percoidei*. Fins with spines; ventral fin thoracic or jugular; maxillary not firmly connected to premaxillaries; gullet without teeth. Page 44.

- Suborder II**      *Scombroidei*. Maxillaries fixed to non-protractile pre-maxillaries forming a pointed beak; lateral line present; finlets behind dorsal and anal; ventrals with spine and 5 rays; caudal fin rays not deeply forked at base. Page 76.
- Suborder III**    *Trichiuroidei*. Very elongate body; maxillaries fixed to non-protractile premaxillaries; pectorals placed low; no free dorsal and anal finlets; ventral absent or reduced; caudal small or wanting and rays not deeply forked at base. Page 76.
- Suborder IV**    *Stromateoidei*. Ventrals if present thoracic or sub-thoracic; scales cycloid; head scaly; lateral line complete; mouth small or moderate with weak jaws; dorsal with rudimentary spines; anal generally with 3 spines. Page 74.
- Suborder V**     *Callionymoidei*. Ventral fins jugular with 1 spine and 5 rays; body naked; 2 dorsal fins with 2-4 spines; no teeth on palate; head and body depressed and tail compressed or head and body more or less cylindrical; lateral line complete; pectorals large and rounded. Page 74.
- Suborder VI**    *Trachinoidei*. One dorsal fin; small scales on body; teeth present in vomer; ventrals jugular or thoracic with 1 spine and 5 rays; body compressed or somewhat depressed; lateral line often complete rarely ending near middle of body. Page 74.
- Suborder VII**   *Acanthuroidei*. Anal with 2 or 3 spines. Ventrals 1 spine and 2-5 rays. Body covered with minute scales; sides of head scaly; caudal peduncle with bony plates or spines; mouth small and terminal. Page 75.
- Suborder VIII**   *Siganoidei*. Each ventral with an outer and inner spine with 3 soft rays between them; anal spines 7-9; body with minute cycloid scales; sides of head scaly; lateral line present; mouth small and terminal and not protractile; no teeth in palate and tongue. Page 75.
- Suborder IX**    *Blenioidei*. Ventral fins if present jugular; anal fin elongate with or without spines; dorsal also long; one dorsal, may be spinous or soft-rayed or have a spinous and soft rayed portion; scales generally small. Page 78.



Suborder X *Anabantoidei*. (Part of ORDER OPHIOCEPHALIFORMES in this bulletin). Body elongate and cylindrical or oblong and compressed; scales large or moderate; single large dorsal fin; ventrals may be thoracic, subabdominal or absent; pseudobranchiae rudimentary or wanting. Page 32.

Suborder XI *Gobiodei*. Body elongated; pseudobranchiae present or rudimentary; single dorsal fin which may be divided or not; lateral line absent. Page 38.

### Sub order PERCOIDEI

#### 4 Super Families :—

Superfamily I *Percoidae*. Usually with ctenoid scales; lateral line generally complete; spinous dorsal well developed; thoracic ventrals usually of 1 spine and 5 rays; pectorals well developed; mouth protractile; 5-8 branchiostegals. Page 44.

Superfamily II *Cirrhitidae*. Lateral line continuous; 3 anal spines; ventrals rather behind pectoral; teeth in vomer and sometimes on palatine. Page 70.

Superfamily III *Labroidae*. Strong teeth in mouth, often canine like; scales cycloid; lateral line continuous or interrupted posteriorly; spinous dorsal well developed; anal spines 2-6; ventrals thoracic with 1 spine and 5 rays; palate edentulous. Page 70.

Superfamily IV *Pomacentroidae*. Body covered with ctenoid scales; lateral line interrupted; single dorsal fin with well developed spinous portion; anal spines 2-3; palate edentulous; single nostril in each side. Page 73.

### Superfamily PERCOIDAE

1	{	Dorsal spines present	..	2	
		Dorsal spines absent	..	32	
2	{	Two separate dorsal fins	..	3	
		One continuous dorsal fin	..	8	
3	{	Two detached spines anterior to anal fin	..	<b>CARANGIDAE</b>	Page 55
		No detached spines	..	5	

5	{	2 barbels behind symphysis of lower jaw; second dorsal fin short	<b>MULLIDAE</b>	Page 60
		No barbels, or, if present the second dorsal is long	6	
6	{	Dorsal with 6-9 spines, 20-37 soft dorsal rays. Anal long ..	7	
		Dorsal with 6-9 spines, 8-10 soft dorsal rays. Anal short ..	<b>APOGONIDAE</b>	Page 48
		Dorsal with 9-12 spines, 16-26 soft dorsal rays. Anal long ..	<b>SILLAGINIDAE</b>	Page 53
7	{	No mucous cavities on head ..	<b>RACHYCENTRIDAE</b>	Page 54
		Large mucous cavities on head ..	<b>LACTARIDAE</b>	Page 54
8	{	Two detached anal spines ..	<b>CARANGIDAE</b>	Page 55
		No detached anal spines ..	9	
9	{	Anal with 1-2 undetached spines	10	
		Anal with 3-7 undetached spines	12	
10	{	Dorsal more or less deeply notched ..	11	
		Dorsal without notch ..	<b>MALACANTHIDAE</b>	Page 70
11	{	Soft dorsal long, more than 15 rays ..	<b>SCIAENIDAE</b>	Page 69
		Soft dorsal short, 12-15 rays ..	<b>SERRANIDAE</b>	Page 49
12	{	A scaly appendage in axil of ventrals or the ventrals may be vestigeal or absent ..	13	
		No scaly process ; ventrals present	22	
13	{	Teeth on palate well developed	14	
		No teeth on palate ..	18	
14	{	Dorsal deeply notched ..	<b>CENTROPOMIDAE</b>	Page 49
		Dorsal not notched or only slightly so ..	15	
15	{	Soft anal rays 7-16 ; origin of dorsal before centre of back ..	16	
		Soft anal rays 15-17 ; origin of dorsal behind centre ..	<b>TOXOTIDAE</b>	Page 63
		Soft anal rays 26-65 ..	17	
16	{	Jaws with an outer row of strong incisor teeth ..	<b>KYPHOSIDAE</b>	Page 63
		Teeth in jaws pointed, generally in several rows, often with an outer enlarged row with or without canines ..	<b>LUTIANIDAE</b>	Page 64

17	{	Ventrals minute ; body compressed and elongate ; dorsal with 5-8 spines and 28-30 soft rays	<b>MONODACTYLIDAE</b> Page 63
		Ventrals well developed ; body not high ; dorsal with 4-6 spines and 9-18 soft rays ..	<b>PEMPHERIDAE</b> Page 63
18	{	Body elongate, dorsal notched with 14 spines and 9 soft rays	<b>EMMELICHTYIDAE</b> Page 54
		Body deep and compressed ; dorsal seldom notched and has many rays ..	21
		Body oblong or elongate ; dorsal not notched ..	19
19	{	Jaws with flat tricuspid curved incisors ..	<b>KYPHOSIDAE</b> Page 63
		No tricuspid curved incisors in jaws ..	20
20	{	Teeth generally pointed arranged in bands ; canines may or may not be present ; dorsal with 10 spines and 10 rays ; anal with 3 spines and 9 rays ..	<b>LUTIANIDAE</b> Page 64
		Teeth in villiform bands, the outer row enlarged ; dorsal with 12 spines and 13-17 rays ..	<b>LOBOTIDAE</b> Page 68
		Jaws with several rows of conical teeth the outer anterior row canine ; lateral row molar ; preoperculum scaly ; dorsal with 11-12 spines and 10-15 rays..	<b>SPARIDAE</b> Page 69
21	{	Teeth minute and uniserial ; dorsal with basal sheath	<b>LIIGNATHIDAE</b> Page 59
		Teeth in brush-like bands in jaws ; body seldom silvery and often with bands or ocelli ..	<b>CHAETODONTIDAE, DREPANIDAE and SCATOPHAGIDAE</b> Page 61
22	{	Lateral line divided into upper and lower portion or incomplete	31
		Lateral line complete ..	23
23	{	Snout tubular greatly produced ; teeth in brush like bands projecting from snout ..	<b>CHAETODONTIDAE and ZANCLIDAE</b> Page 61
		Snout not tubular ..	24
24	{	Dorsal spines 12-14 ..	30
		Dorsal spines 6-11 ..	25

25	{ Inner series of teeth in jaw enlarged and depressible ..	<b>SERRANIDAE</b> Page 49
	{ No depressible teeth ..	26
26	{ Maxillary scaled; mouth large and oblique ..	29
	{ Maxillary naked ..	27
27	{ Dorsal spines 6-8 ..	<b>SERRANIDAE</b> Page 49
	{ Dorsal spines 10 ..	28
	{ Dorsal spines 11 ..	<b>CHAETODONTIDAE</b> Page 61
28	{ Soft anal rays 6-8 ..	<b>SERRANIDAE</b> Page 49
	{ Soft anal rays 10-12 ..	<b>KUHLIDAE</b> Page 47
29	{ Eye very large; pectorals much shorter than head ..	<b>PRIACANTHIDAE</b> Page 49
	{ Eye moderate; pectorals as long as head ..	<b>SERRANIDAE</b> Page 49
30	{ Scales large; lateral scales 40-42 ..	<b>SERRANIDAE</b> Page 49
	{ Scales moderate; lateral line 47-95 ..	<b>THERAPONIDAE</b> Page 53
31	{ Dorsal with 11-12 spines and 6-9 rays ..	<b>PLESIOPIDAE</b> Page 49
	{ Dorsal with 2-7 spines ..	<b>SERRANIDAE</b> Page 49
32	{ Dorsal rays, 57-64; anal rays 25-30; body elongate; scales small ..	<b>CORYPHAENIDAE</b> Page 54
	{ Dorsal with 3-4 undivided and, 40-42 divided rays; anal rays 30-32; scales minute; body strongly compressed, deep, nearly triangular in shape ..	<b>MENIDAE</b> Page 54

## Order Perciformes

### Suborder PERCOIDEI

#### Superfamily Percoidae

#### *Family KUHLIDAE*

Pseudobranchiae present; 6 branchiostegals; spinous dorsal well developed with ten spines; dorsal and anal fitting into a sheath or furrow; anal with 3 spines; operculum with spines; teeth villiform and present in jaws, vomer and palatines; one genus with two species.

- |   |   |                          |
|---|---|--------------------------|
| { | Lateral scales 40–45. 16–19 gill-rakers on lower part of anterior arch ..                               | <b>Kuhlia marginatus</b> |
|   | Lateral scales 53–56. 23–26 gill-rakers on lower part of anterior arch. Caudal with 5 blackish bands .. | <b>Kuhlia taeniura</b>   |

*Family APOGONIDAE*

Well developed pseudobranchiae present; 7 Branchiostegals; operculum with 1 or 2 very weak spines or a flap which may be minutely denticulated; head large; villiform teeth in jaws, vomer and palatines; no dorsal sheath or furrow; two separate dorsal fins, the first with 6–7 spines; two genera with several species.

- |   |   |                                       |
|---|---|---------------------------------------|
| { | Teeth in vomer, jaws and palatines minute or villiform; no true canines ..              | <b>Apogon</b> Page 48                 |
|   | Jaws with minute or villiform teeth; at least a pair of symphyseal canine teeth present | <b>Cheilodipterus quinquelineatus</b> |

GENUS APOGON

- |     |   |                              |
|-----|---|------------------------------|
| 1 { | Anal rays not more than 8–10 ..   | 2                            |
|     | Anal rays 13–17 soft; dorsal spines 6; preoperculum serrated  | <b>Apogon lineolatus</b>     |
| 2 { | Dorsal spines 7 ..  | 3                            |
|     | Dorsal spines 6 ..  | <b>Apogon hyalosoma</b>      |
| 3 { | Free margin of preoperculum serrated. Caudal generally forked   | 4                            |
|     | Free margin of preoperculum smooth or with some serrations at angle only; Caudal subtruncate or rounded; maxillary reaches middle of eye .. | <b>Apogon ellioti</b>        |
| 4 { | Dorsal spines strong, the third generally much stronger than others; often dark longitudinal bands on body ..                               | 5                            |
|     | Dorsal spines weaker, the third one not or only slightly stronger than others; no dark longitudinal bands ..                                | <b>Apogon aureus</b>         |
| 5 { | Maxillary reaches below posterior half of eye; dark longitudinal bands continued on caudal ..   | <b>Apogon endakataenia</b>   |
|     | Maxillary reaches below middle of eye; bands if present seldom continued to caudal ..   | <b>Apogon septemstriatus</b> |

*Family PLESIOPIDAE*

Pseudobranchiae present; 6 branchiostegals; body oblong and compressed; mouth protractile; dorsal spines 11-12; anal spines 3; caudal rounded; long gill rakers.

One genus and species .. **Plesiops nigricans**

*Family PRIACANTHIDAE*

Pseudobranchiae present; 6 branchiostegals; body oblong and somewhat elevated; eyes large; lower jaw prominent; single dorsal with 10 spines; anal spines 3; no teeth on tongue; suborbital and preoperculum serrated; caudal truncate.

Single genus and species .. **Priacanthus holocentrum**

*Family CENTROPOMIDAE*

Pseudobranchiae present; seven branchiostegals; lateral line complete; maxillary totally exposed, not slipping under preorbital; 7-9 strong dorsal spines; a recumbent forwardly directed spine in front of dorsal.

- |   |   |                          |
|---|---|--------------------------|
| { | Ventrals with scaly axillary process; preoperculum has a single ridge, serrated posteriorly; parietal and occipital crests present; supplemental maxillary bone present; caudal rounded | <b>Lates calcarifer</b>  |
|   | Ventrals without a scaly axillary process; lower limb of preoperculum is serrated or spinous; occipital crests present, no supplemental maxillary bone; caudal furcate                  | <b>Ambassis. Page 49</b> |

Genus **AMBASSIS**

- |   |                          |                                  |
|---|--------------------------|----------------------------------|
| { | Lateral line continuous  | .. <b>Ambassis commersoni</b>    |
|   | Lateral line interrupted | .. <b>Ambassis gymnocephalus</b> |

*Family SERRANIDAE*

Pseudobranchiae present; 5-8 branchiostegals; oblong, compressed body of medium or large size; lateral line, usually complete, not extending on caudal; scales normally small; inconspicuous, embedded in skin; head entirely scaly and scales always present on cheeks and on entire

operculum ; 2 pairs of nostrils ; spinous dorsal present, separated from or united at base of the soft many rayed portion ; pectorals thoracic ; supplemental maxillary present.

### 3 Subfamilies

1. Preoperculum with several strong spines ; teeth in villiform bands, those on vomer in '  $\wedge$  ' form ; Ventrals thoracic ; gill membranes separate ; chin with a dermal appendage .. **Grammistinae.** Page 50
2. Preoperculum with a double serrated edge ; scales not embedded ; teeth in villiform bands, those on vomer in two separate patches ; ventrals below pectorals ; gill membranes united ; no appendage on chin .. **Diploprioninae.** Page 50.
3. Preoperculum smooth edged or moderately serrated ; scales minute ; teeth pluriseriata, the inner series enlarged, depressible, hinged at base ; ventrals below or behind base of pectorals ; no appendage on chin .. **Epinephelinae.** Page 51

#### Subfamily GRAMMISTINAE

Branchiostegals 7 ; pseudobranchiae present ; body oblong ; compressed ; other characters as given for family and sub-family earlier.

One species .. .. **Grammistes sexlineatus**

#### Sub-family DIPLOPRIONINAE

Body oblong oval, anteriorly elevated ; lateral line strongly arched ; peak of arch below middle of spinous dorsal ; branchiostegals 7 ; pseudobranchiae large.

One species .. .. **Diploprion bifasciatum**

Subfamily EPINEPHELINAE

Body oblong or elongate, more or less compressed, often stout; lateral line complete; maxillary large with a supplemental bone; branchiostegals 7; pseudobranchiae present. 3 Genera.

- |   |   |   |                             |
|---|---|---|-----------------------------|
| 1 | } | Dorsal with 6-8 spines and 11-12 rays; lower border of preoperculum with antrose spines; front of head, snout and suborbital bones naked; anal and ventral spines free and flexible .. .. . | <b>Plectropoma.</b> Page 51 |
|   |   | Dorsal with 9-11 spines and 12-21 rays; no antrose spines on lower border of preoperculum; head entirely scaly; anal and ventral spines strong .. .. .                                      | 2                           |
| 2 | } | One or two curved canines on each side of mandible beside those in front .. .. .  | <b>Variolla.</b> Page 51    |
|   |   | No curved spines on each side of mandible .. .. .   | <b>Epinephelus.</b> Page 51 |

Genus PLECTROPOMA

Canine teeth present; palatines toothed; other characters as in subfamily and genus given earlier; one species .. **Plectropoma maculatum**

Genus VARIOLA

Canine teeth present. Palatine toothed; other characters as in subfamily and genus given earlier .. .. **Variola louti**

Genus EPINEPHELUS

Canine teeth present. Palatine toothed. Rest as in subfamily and genus given earlier. Several species.

- |   |   |  |                                 |
|---|---|--|---------------------------------|
| 1 | } | Dorsal spines 9 .. .. .  | 2                               |
|   |   | Dorsal spines 11 .. .. .   | 6                               |
| 2 | } | Anal rays 8 .. .. .  | 3                               |
|   |   | Anal rays 9 .. .. .  | 4                               |
| 3 | } | Second anal spine as long as or a little shorter than soft rays; head uniform or spotted .. .. .   | <b>Epinephelus pachycentrum</b> |
|   |   | Second anal spine conspicuously shorter than soft rays; head uniform with transverse lines .. .. . | <b>Epinephelus boenack</b>      |



4	{	Caudal truncate; colour uniform dark brown or black; dorsal with 9 spines and 17-18 rays Caudal rounded ..	<b>Epinephelus rogae</b> 5
5	{	Lateral scales 100-112; 11-15 rows of scales above lateral line .. Lateral line scales 81-105; 8-10 rows of scales above lateral line ..	<b>Epinephelus sonnerati</b>  <b>Epinephelus miniatus</b>
6	{	Caudal subtruncate, truncate or emarginate .. Caudal rounded ..	12 7
7	{	Last dorsal spine considerably shorter than third spine .. Last dorsal spine not shorter than third spine or if shorter only slightly so ..	<b>Epinephelus maculatus</b>  8
8	{	Opercular spines equidistant or nearly so .. Middle opercular spine nearer to lower than upper ..	11 9
9	{	Dorsal rays 15-17; 10-12 scales above lateral line .. Dorsal rays 14-16; 11-15 scales above lateral line ..	<b>Epinephelus merra</b> 10
10	{	Lateral scales 110-114; 15 scales above lateral line; black blotch on base of caudal peduncle .. Lateral scales 95; 14 rows of scales above lateral line; fins with black bars, more or less broken up into spots ..	<b>Epinephelus fuscoguttatus</b>  <b>Epinephelus lanceolatus</b>
11	{	Uniform yellowish or pink, with or without cross bands; maxillary does not extend beyond posterior border of eye .. Uniform brown, or with indications of dark cross bars or blotches; maxillary reaching beyond posterior border of eye	<b>Epinephelus fasciatus</b>  <b>Epinephelus tauvina</b>
12	{	Body length 2.4-2.7 times height .. Body length 2.8-3 times height	<b>Epinephelus flavocaeruleus</b> 13

13	{	Dorsal rays 18-19; head with spots, confluent into wavy lines on body ..	<b>Ephinephelus undulosus</b>
		Dorsal rays 15-17; Opercular spines nearly equidistant ..	14
		Dorsal rays 14-15; body with bands running obliquely backwards to dorsal ..	<b>Epinephelus morrhua</b>
14	{	12-15 rows of scales above lateral line; large spots, vertical fins with a dark band, bordered by light band ..	<b>Epinephelus areolatus</b>
		16 rows of scales above lateral line; brown with a mesh work of light brown ..	<b>Epinephelus chlorostigma</b>
		15-16 rows of scales above lateral line, lower half of caudal dark brown ..	<b>Epinephelus bleekeri</b>

*Family THERAPONIDAE*

Body oblong to oblong-ovate; lateral line complete; pseudobranchiae large; 6 branchiostegals; preoperculum more or less strongly serrated; operculum with two strong spines; ventrals well behind pectorals; 2 genera.

1	{	Upper jaw with 3 rows and lower jaw with 2 rows of teeth, the outer rows much enlarged with brown tips; gill membranes separate, nearly free from isthmus; one species ..	<b>Pelates quadrilineatus</b>
		Both jaws with teeth in villiform band, the outer series more or less enlarged; gill membranes united with a slight attachment to isthmus ..	<b>Therapon—2</b>
2	{	Preoperculum with enlarged angular spines; 10-13 rows of scales between lateral line and spinous dorsal; lateral scales 90-95 ..	<b>Therapon puta</b>
		Preoperculum with even serrations; 14-15 rows of scales between spinous dorsal and lateral line; lateral scales 80-90 ..	<b>Therapon jarbua</b>

*Family SILLAGINIDAE*

Body elongate usually tapering from middle of spinous dorsal to head and tail; small scales; lateral line complete; mouth small and terminal, branchiostegals 6; pseudobranchiae present; gill openings wide.

One genus and species .. **Sillago sihama**

*Family EMMELICHTHYIDAE*

Body elongate ; scales small ; head totally scaly except at tip of snout which is usually naked ; 6-7 branchiostegals ; pseudobranchiae present ; minute teeth ; ventrals originate below base of pectorals or near their middle ; caudal deeply forked.

Single genus and species .. **Dipterygonotus leucogrammicus**

*Family CORYPHAENIDAE*

Body oblong or elevated and compressed ; gill openings wide ; 5-7 branchiostegals ; pseudobranchiae absent ; one long dorsal fin without distinct spinous division ; cleft of mouth wide ; scales small ; caudal deeply forked ; one genus, one species with 2 sub-species.

}	Distance between eyes 3.5-4 times eye diameter ; dorsal rays 58-60 ..	<b>Coryphaena hippurus hippurus</b>
	Distance between eyes 2.5 times eye diameter, dorsal rays 53-58 ..	<b>Coryphaena hippurus equisetis</b>

*Family MENIDAE*

Body strongly compressed and nearly triangular ; scales minute not visible to naked eye ; lateral line about parallel to dorsal profile, stopping below posterior end of dorsal fin ; teeth in jaws in villiform bands but none on palate ; head small ; branchiostegals present ; caudal deeply notched ; ventrals before pectorals.

One genus and species .. **Mene maculata**

*Family LACTARIDAE*

Body oblong, compressed ; mouth large ; scales moderate size and deciduous ; jaws with small, curved pointed teeth ; first dorsal with 7-8 feeble spines ; ventrals below base of pectorals ; caudal deeply emarginate upper surface of head with large muciferous cavities ;

Single genus and species .. **Lactarius lactarius**

*Family RACHYCENTRIDAE*

Body elongate, sub-cylindrical ; mouth terminal and almost horizontal ; scales small ; branchiostegals 7 ; pseudobranchiae present ; first dorsal is of 7-9 free spines which are depressible into a groove ; caudal emarginate ; ventrals before pectorals.

Single genus and species .. **Rachycentron canadus**

*Family CARANGIDAE*

Caudal peduncle slender ; lateral line nearly always armed with scutes at least on its posterior straight portion which may form a bony spinous caudal keel ; generally 7 branchiostegals ; pseudobranchiae present but sometimes disappearing with age ; first dorsal spinous and depressible into a groove, often preceded by a procumbent spine ; soft dorsal may contain finlets ; ventrals thoracic ; caudal weakly forked ; 4 subfamilies recognisable.

- |   |  |   |                               |
|---|--|---|-------------------------------|
| 1 | Lateral line armed with scutes ;<br>maxillary with supplemental<br>bone .. .. .        | 2 | <b>Caranginae. Page 55</b>    |
|   | Lateral line without scutes .. .. .  | 2 |                               |
| 2 | Soft dorsal and anal of equal<br>length ; no supplemental bone<br>on maxillary .. .. . | 3 |                               |
|   | Anal much shorter than soft<br>dorsal ; distinct supplemental<br>bone .. .. .          |   | <b>Seriolinae. Page 58</b>    |
| 3 | Several finlets behind dorsal ;<br>scales ovate, lanceolate or<br>needle like .. .. .  |   | <b>Chorineminae. Page 58</b>  |
|   | Without finlets ; scales small<br>rounded .. .. .                                      |   | <b>Trachinotinae. Page 58</b> |

Sub family CARANGINAE

- |   |  |   |                            |
|---|--|---|----------------------------|
| 1 | Dorsal and anal fins with<br>posterior rays separated as<br>finlets .. .. .  | 2 |                            |
|   | Dorsal and anal without finlets .. .. .  | 3 |                            |
| 2 | Finlets 6-9 ; lateral scutes 53-58<br>starting from below spinous<br>dorsal fin .. .. .  |   | <b>Megalaspis cordyla</b>  |
|   | Finlets 1 ; lateral scutes 40,<br>starting after origin of soft<br>dorsal fin .. .. .  |   | <b>Decapterus russelli</b> |
| 3 | Dorsal spines fewer than 7, rudi-<br>mentary and unconnected by<br>a membrane ; scales obscured ;<br>lateral scutes feeble .. .. . | 4 |                            |
|   | Dorsal spines 7 or 8, connected<br>by membrane ; scales present ;<br>lateral scutes prominent .. .. .                              | 5 |                            |
| 4 | Preorbital shorter than eye ; gill<br>rakers long and slender .. .. .  |   | <b>Alectis ciliaris</b>    |
|   | Preorbital nearly twice eye ; gill<br>rakers short and stout .. .. .   |   | <b>Alectis indica</b>      |

5	{	Abdomen with a deep median groove, containing vent and detached anal spines, receiving the ventral fins; some dorsal and anal rays filamentous ..	<b>Atropus atropus</b>
		No deep abdominal groove; no filamentous dorsal and anal rays	6
6	{	Teeth absent on upper jaw ..	7
		Teeth in upper jaws, vomer and palatines ..	8
7	{	Minute teeth in single series in lower jaw and some rudimentary teeth on tongue ..	<b>Caranx (Selaroides) leptolepis</b>
		Teeth entirely absent ..	<b>Caranx (Gnathanodon) speciosus</b>
8	{	Breast completely scaled ..	9
		Breast naked ventrally and sometimes laterally ..	12
9	{	Groove in shoulder-girdle under operculum; teeth equal and small ..	10
		No groove in shoulder-girdle; teeth in outer series enlarged often caniniform anteriorly ..	20
10	{	Last dorsal and anal ray finlet-like and a little separated from rest of fin ..	<b>Caranx (Selar) mate</b>
		Last dorsal and anal ray not separated ..	11
11	{	Lateral line with 48-56 scutes, the broadest 1/9-1/10 body height ..	<b>Caranx (Selar) malam</b>
		Lateral line with 40-46 scutes, the broadest 1/6-1/7 body height ..	<b>Caranx (Selar) kalla</b>
12	{	Breast naked only in median line; anterior dorsal and anal rays not produced to form a falciform lobe ..	<b>Caranx (Carangoides) praeustus</b>
		Breast completely naked ventrally, except for a small median patch and mostly so laterally; anterior dorsal and anal rays prolonged into falciform lobe ..	13

13	{	At least anteriorly, teeth in several rows in lower jaw ..	14	
		Teeth in single series in lower jaw ..	21	
14	{	Ant. part of lat. line shorter than post. part ..	15	<b>Caranx (Carangoides) oblongus</b>
		Ant. part of lat. line, longer than post. part ..		
15	{	Curved part of lateral line about 1.5 times or more in length of straight part ..	16	
		Curved part of lateral line less than 1.5 times length of straight part ..	17	
16	{	Gill-rakers 16-17 ..		<b>Caranx (Carangoides) chrysophrys</b>
		Gill-rakers 23-25 ..		<b>Caranx (Carangoides) malabaricus</b>
17	{	Anterior dorsal rays much longer than head ..	18	
		Anterior dorsal rays not longer than head ..	19	
18	{	Lateral line with 20 feeble scutes ; dentition complete ..		<b>Caranx (Carangoides) armatus</b>
		Lateral line with 25 scutes ; dentition reduced or absent ..		<b>Caranx (Carangoides) dinema</b>
19	{	No opercular spot ..		<b>Caranx (Carangoides) gymnotethoides</b>
		Opercular spot distinct ..		<b>Caranx (Carangoides) ferdau</b>
20	{	Anal rays 15-17 ; 30-33 scutes in lateral line ..		<b>Caranx (Caranx) sexfasciatus</b>
		Anal rays 18-20 ; 36-38 scutes in lateral line ..	23	
21	{	Lateral with 30 or less scutes ..		<b>Caranx (Caranx) ignobilis</b>
		Lateral with 33-37 scutes ..	22	
22	{	Head length 4.0-4.75 times eye diameter ; cleft of mouth commences opposite lower edge of eye ; breast scaly laterally ..		<b>Caranx (Caranx) sansun</b>
		Head length 3.5-4.0 times eye diameter ; cleft of mouth commences opposite lower third of eye ; a few breast scales near pectoral ..		<b>Caranx (Caranx) carangus</b>
23	{	Colour bluish green or brown without spots ..		<b>Caranx (Caranx) melampygu</b>
		Colour dusky and silvery with numerous irregular spots ..		<b>Caranx (Caranx) stellatus</b>

### Subfamily TRACHINOTINAE

Body strongly compressed; head small, 7 branchiostegals; no pseudobranchiae; teeth small; first dorsal has an anterior procumbent spine and 5 or 6 erect ones; soft dorsal and anal highly falcate anteriorly; One genus with 3 species.

- |   |   |   |                             |
|---|---|---|-----------------------------|
| 1 | { | Length not more than twice the height; cleft of mouth commences opposite below level of eye. Body without spots ..        | <b>Trachinotus blochi</b>   |
|   |   | Length more than twice height; cleft of mouth opposite middle or lower third of eye; body with 2-6 lateral round spots .. | 2                           |
| 2 | { | Snout blunt, 2-5 spots ..   | <b>Trachinotus bailloni</b> |
|   |   | Snout pointed, 3-6 spots ..   | <b>Trachinotus russelli</b> |

### Subfamily CHORINEMINAE

Body compressed; head compressed and pointed with a sharp occipital keel; pseudobranchiae present; first dorsal has a procumbent spine followed by 6-7 erect spines; second dorsal with one spine and numerous rays, the posterior of which are more or less like finlets; caudal deeply incised; one genus and 4 species.

- |   |   |  |                                |
|---|---|--|--------------------------------|
| 1 | { | Scales small but conspicuous and ovate or lanceolate ..  | 2                              |
|   |   | Scales needle shaped or thread-like ..   | <b>Chorinemus tol</b>          |
| 2 | { | Snouth blunt, its length, nearly equal to eye diameter; maxillary surpassing hind border of eye ..                   | <b>Chorinemus lysan</b>        |
|   |   | Snout pointed, its length equal to eye diameter or somewhat longer in adult. Maxillary reaches hind border of eye .. | 3                              |
| 3 | { | Body elongate; length at least 4 times height ..   | <b>Chorinemus sancti petri</b> |
|   |   | Body rather deep, length about 3.5 height ..   | <b>Chorinemus tala</b>         |

### Subfamily SERIOLINAE

Body elongate slightly compressed; 7 branchiostegals; scales small; caudal deeply incised; ventrals behind base of pectorals.

- |   |  |                              |
|---|--|------------------------------|
| { | Dorsal spines 5-7 and separate in adult .. | <b>Nauerates ductor</b>      |
|   | Dorsal spines connected by membrane ..     | <b>Seriola nigrofasciata</b> |

*Family LIOGNATHIDAE*

Bony ridges may be present on top of head; eyes lateral; gape of mouth small; mouth very protractile; proximal extremity of maxillary curved; pseudobranchiae present or absent; 5-6 branchiostegals; no teeth on palate; those on jaws minute; a single dorsal with 8-11 spines and 10-16 rays with a conspicuous dorsal sheath; anal with sheath; 3-5 spines and 7-8 or 13-14 rays; pectorals more or less falcate; 3 general-several species.

- |   |  |   |                             |
|---|--|---|-----------------------------|
| 1 | Top of head with bony ridges; scales small; branchiostegals 5; dorsal with 8 spines and 15-16 rays; anal with 3 spines and 14 rays ... | 2 |                             |
|   | Top of head smooth; scales large; branchiostegals 6; dorsal with 9-10 spines and 10-11 rays; anal 3 spines and 7-8 rays ..             |   | <b>Gerres. Page 60</b>      |
| 2 | Teeth in jaws minute in a single series ..   |   | <b>Leiognathus. Page 59</b> |
|   | Sharp canine teeth present ..  |   | <b>Gazza. Page 60</b>       |

Genus LEOGNATHUS

- |   |   |   |                               |
|---|---|---|-------------------------------|
| 1 | Mouth very small, oblique; when fully protracted forming a horizontally or upwardly directed tube; when closed, mandible ascending nearly vertical; ventral profile much more convex than the dorsal  | 2 |                               |
| 1 | Mouth small, horizontal or directed slightly downward; when fully protracted forming a more or less downwardly directed tube; when closed mandible forming an angle of 30°-45° from horizontal; dorsal and ventral profile equally convex or if unequal the dorsal more convex .. | 3 |                               |
| 2 | Body oblong; length twice the height; scales minute, about 50 in longitudinal rows; no markings on head ..  |   | <b>Leiognathus insidiator</b> |
|   | Body oval; length less than twice height; scales of moderate size in longitudinal rows of about 30; a black line from front-border of orbit to chin; operculum black bordered ..  |   | <b>Leiognathus ruconius</b>   |



3	{	Gape of mouth commencing below lower border of eye; dorsal profile more convex than ventral; snout truncate..	4
		Gape of mouth commencing opposite lower third of eye; snout not truncate ..	6
4	{	Scales on breast thin giving a naked appearance; mandible strongly concave ..	5
		Breast conspicuously covered by normal scales; mandible only slightly concave ..	<b>Leiognathus splendens</b>
5	{	Second dorsal spine elongate nearly equal to body height..	<b>Leiognathus fasciatus</b>
		Second dorsal spine short less than half body height ..	<b>Leiognathus equulus</b>
6	{	Breast naked ..	<b>Leiognathus daura</b>
		Breast scaly ..	<b>Leiognathus bindus</b>

Genus GAZZA

For character see key to Liognathidae.

One genus and species

**Gazza minuta**

Genus GERRES

Teeth small only in jaws; 6 branchiostegals; 4 gills; pseudobranchiae present; gill membranes free; dorsal single with 9 spines and 10 rays; anal with 3 spines and 7 rays; pectorals long and pointed, origin of ventrals below or somewhat behind origin of pectorals.

{	Lateral scales 35 ..	<b>Gerres limbatus</b>
	Lateral scales 40 ..	<b>Gerres setifer</b>
	Lateral scales 45; second dorsal spine produced into a filament ..	<b>Gerres punctatus</b>
	Lateral scales 46-48 ..	<b>Gerres oblongus</b>

*Family MULLIDAE*

Large scales on body and head; long barbels behind symphysis of lower jaw; gill membranes free; 3-4 branchiostegals; pseudobranchiae present; 2 separate dorsal fins; 3 genera.

1	{	Teeth on vomer and palatines ..	<b>Upeneus.—Page 61</b>
		No teeth on palate; dorsal and anal without scutes ..	2
2	{	Teeth in jaws in villiform bands; lateral line scales 35-40 ..	<b>Mulloidichthys.—Page 60</b>
		Teeth in jaws in a single series; lateral line scales 28-30 ..	<b>Parupeneus.—Page 61</b>

Genus MULLOIDICHTHYS

One species ..

**Mulloidichthys auriflamma**

Genus PARUPENEUS

- |   |   |  |                           |
|---|---|--|---------------------------|
| 1 | { | Second dorsal spine rigid and strong .. 2                            | <b>Parupeneus indicus</b> |
|   |   | Second dorsal spine flexible ..                                      |                           |
| 2 | { | Body with 2-3 brown vertical bands .. <b>Parupeneus trifasciatus</b> |                           |
|   |   | Body without vertical bands .. <b>Parupeneus macronema</b>           |                           |

Genus UPENEUS

- |   |   |  |                        |
|---|---|--|------------------------|
| 1 | { | Preorbital scaleless .. 2                                  | <b>Upeneus tragula</b> |
|   |   | Preorbital scaled ..                                       |                        |
| 2 | { | Caudal not banded ... <b>Upeneus sulphureus</b>            |                        |
|   |   | Caudal with 4 or 5 oblique bands <b>Upeneus vittatus</b>   |                        |
|   |   | Caudal with 6 oblique bands .. <b>Upeneus taeniopterus</b> |                        |

Family CHAETODONTIDAE

Body more or less compressed; mouth small; teeth slender and bony on jaws; palate more often toothless; branchiostegals 5-7; pseudo-branchiae present; dorsal single, usually long; pectorals have outer lower rays branched; ventrals thoracic; 7 subfamilies with several species.

- |   |   |  |
|---|---|--|
| 1 | { | Spinous and soft dorsal separate; <b>Ephippinae</b> , one genus and species <b>Ehippus orbis</b>   |
|   |   | Dorsal single with spinous region in front .. 2  |
| 2 | { | First dorsal spine procumbent .. 3   |
|   |   | No procumbent dorsal spine .. 4  |
| 3 | { | Mouth protractile; <b>Drepaninae</b> ; one species and genus .. <b>Drepane punctata</b>            |
|   |   | Mouth not protractile; <b>Scatophaginae</b> ; one species and genus .. <b>Scatophagus argus</b>    |
| 4 | { | Mouth protractile .. 5   |
|   |   | Mouth not protractile; <b>Platacinae</b> ; one genus and species .. <b>Platax orbicularis</b>      |
| 5 | { | Scales minute almost microscopic; <b>Zanclinae</b> ; one genus and species <b>Zanclus cornutus</b> |
|   |   | Scales moderate .. 6   |

6	{	Preoperculum strongly armed ; long spine on preoperculum ; no axillary scale on ventral, <b>Chaetodontinae</b> .. 7	
		No strong spine on preoperculum in adult ; axillary scale on ventral, <b>Pomacanthinae</b> .. 15	
7	{	Dorsal spines 6, weak, posterior one highest .. <b>Parachaetodon ocellatus</b>	
		Dorsal spines 11-13, strong, middle ones highest .. 8	
	{	Fourth dorsal spine prolonged .. <b>Heniochus acuminatus</b>	
		No dorsal spines prolonged .. 9	
9	{	Scales of one type with regularly rounded posterior border .. 10	
		Scales ciliated of two kinds, some with posterior border of un- even sides ; others, much smaller and regularly rounded 11	
10	{	Dorsal with 13 spines and 21-23 rays ; height of spinous dorsal twice height of soft dorsal .. <b>Chaetodon (Rhabdophorus)</b> <b>trifasciatus</b>	
		Dorsal 12 spines and 19-20 rays ; spinous dorsal about height of soft dorsal .. <b>Chaetodon (Chaetodontops)</b> <b>melanotus</b>	
11	{	Lateral line regularly arched ; preoperculum with weak ser- rations at margin .. 12	
		Lateral line strongly angulate or moderately arched ; pre- operculum margin smooth or nearly so .. <b>Anisochaetodon (Lepidochae-</b> <b>todon) unimaculatus</b>	
12	{	Ocular band from occiput to isthmus or sub operculum .. 13	
		Ocular band short ; stops short of occiput dorsally ; above it shoe shaped patch .. <b>Anisochaetodon (Linophora)</b> <b>chrysurus</b>	
13	{	Fifth and sixth dorsal rays pro- duced and setiform .. <b>Anisochaetodon (Linophora)</b> <b>auriga</b>	
		No produced dorsal rays .. 14	

14	{	Gape of mouth commences above level of lower border of eye; body with six dark oblique lines	<b>Anisochaetodon (Linophora) vagabundus</b>
		Gape of mouth commences below eye; body checkered ..	<b>Anisochaetodon (Linophora) rafflesi</b>
15	{	Scales small, over 75, not arranged in regular series ..	16
		Scales large, 50 or less, arranged in regular series ..	<b>Holocanthus xanthurus</b>
16	{	Stripes on body longitudinal, more or less oblique ..	17
		Stripes vertical, dotted or uniformly dull ..	<b>Pomacanthus (Pomacanthodes) semicirculatus</b>
17	{	Stripes on body 15-25; dorsal 14 spines and 19-21 rays ..	<b>Pomacanthus (Pomacanthodes) imperator</b>
		Stripes on body 6; dorsal spines 13 and 21-22 rays ..	<b>Pomacanthus (Pomacanthodes) annularis</b>

*Family TOXOTIDAE*

Body oblong, more or less compressed; eyes large, snout produced, lower jaw longer than upper; dorsal with 4-5 spines and 11-14 rays; caudal almost truncate; 7 branchiostegals.

One genus and species .. **Toxotes chatareus**

*Family MONODACTYLIDAE*

Body strongly compressed, branchiostegals 6; single dorsal with 5-8 spines; anal 3 spines; dorsal and anal long.

One genus and species .. **Monodactylus argenteus**

*Family PEMPHERIDAE*

Body oblong—ovate to elliptical; head obtuse, snout blunt; 6-7 branchiostegals; pseudobranchiae present; teeth small; dorsal single with 4-6 spines.

Ventrals below pectorals .. **Pempheris mangula kutti**  
(Doubtful species) .. **Pempheris macrolepidotus**

*Family KYPHOSIDAE*

Body elongate-ovate, completely covered with rather small scales; mouth small; 7 branchiostegals; dorsal single with 11 spines.

One genus and species .. **Kyphosus cinerascens**

*Family LUTIANIDAE*

Maxillary broadest in posterior part ; gill membranes free from isthmus ; 5-7 branchiostegals ; pseudobranchiae present ; origin of dorsal close to head ; dorsal with 9-15 spines and 9-20 rays ; anal with 13 spines and 7-14 rays ; ventrals originate behind pectoral ; 4 subfamilies.

- |   |   |   |                             |
|---|---|---|-----------------------------|
| 1 | { | Preoperculum with scales .. 2   |                             |
|   |   | Preoperculum scaleless ..   | <b>Lethrininae</b> Page 68  |
| 2 | { | Vomer and palatines often with teeth ; if the palate is toothless either the dorsal is deeply notched, appearing as two separate fins or anal with 3 spines and 11-14 rays or the lower jaw has symphyseal knob and dorsal with 9 spines and 9-10 rays or the teeth in jaws are minute .. | <b>Lutianinae</b> Page 64   |
|   |   | Palate toothless ..   | 3                           |
| 3 | { | Dorsal and anal spines weak ; preorbital naked ; dorsal 10 spines and 9-16 rays ; anal 3 spines ; 7-11 rays ..  | <b>Nemipterinae</b> Page 66 |
|   |   | Dorsal and anal spines robust ; Preorbital scaly ; dorsal 9-15 spines, 12-20 rays ; and 3 spines, 7 or 8 rays ..  | <b>Pomadasnae</b> Page 67   |

Subfamily LUTIANINAE

4 Genera—**Lutianus, Caesio, Aprion, Aphaereus**

- |   |   |  |                                      |
|---|---|--|--------------------------------------|
| 1 | { | Dorsal and anal fins more or less scaly ..   | 5                                    |
|   |   | Dorsal and anal fins scaleless ..  | 2                                    |
| 2 | { | Teeth on vomer and palatines ..  | 4                                    |
|   |   | Palate toothless ..  | 3                                    |
| 3 | { | First branchial arch with 16-18 gill rakers on lower limb ..   | <b>Aphaereus furcatus</b>            |
|   |   | First branchial arch with 30-33 gill rakers on lower limb ..   | <b>Aphaereus rutilans</b>            |
| 4 | { | Pectorals short, rounded, equal in length to snout ..  | <b>Aprion (Aprion) virescens</b>     |
|   |   | Pectorals pointed, nearly equal in length to head ..   | <b>Aprion (Pristipomoides) typus</b> |
| 5 | { | Mouth large and protractile ; teeth on vomer and palatine well developed ; caudal truncate or somewhat emarginate .. | 6                                    |
|   |   | Mouth of moderate size or small ; caudal deeply forked ..  | <b>Caesio chrysozona</b>             |

6	Scales above lateral line in rows parallel to it throughout or parallel to it anteriorly only, ascending somewhat in the region posterior to soft dorsal	<b>Lutianus johni</b>	
		Scales above lateral line in rows parallel to it in the anterior part only, ascending sharply to dorsal profile in the region posterior to spinous dorsal; scales on head behind eye; Anterior part of soft anal and ventral dark ..	<b>Lutianus argentimaculatus</b>
		Scales above lateral line in rows ascending obliquely to dorsal profile, sometimes the part of the rows in front of and below spinous dorsal parallel to lateral line ..	7
7	Scales on head begin above middle of eye; temporal region scaly ..	8	
	Scales on head begin behind eye; temporal region naked or nearly so ..	11	
8	Vomerine teeth in a "△" or a "△" ..	9	
	Vomerine teeth in a "∧" ..	<b>Lutianus kasmira</b>	
9	Dorsal spines 10, (exceptionally 9 or 11); 6-7 rows of scales between lateral line and median dorsal spines ..	<b>Lutianus vitta</b>	
	Dorsal spines 11; 5 rows of scales between lateral lines and median dorsal spines ..	10	
10	Lower preopercular limb scaly ..	<b>Lutianus lineolatus</b>	
	Lower preopercular limb naked ..	<b>Lutianus biguttatus</b>	
11	Rows of scales below lateral line ascending, those on lower part of sides sometimes parallel to body axis ..	12	
	All longitudinal scales below lateral line parallel to body axis ..	15	
12	Three broad transverse bands on head and body; anal of 3 spines and 10-11 rays ..	<b>Lutianus sebae</b>	
	No dark transverse bands; anal of 3 spines and 8 or 9 rays ..	13	

13	{	Soft dorsal rounded ..	14
		Soft dorsal pointed ..	<b>Lutianus malabaricus</b>
14	{	Dorsal spines 10 ; dorsal rays 13-15	<b>Lutianus gibbus</b>
		Dorsal spines 11 ; dorsal rays 14	<b>Lutianus sanguineus</b>
15	{	Vomerine teeth in a triangular patch with a posterior prolongation or in a diamond shaped patch ..	16
		Vomerine teeth in a triangular patch without posterior prolongation or in a " ^ " ..	17
16	{	A large black blotch in lateral line below last spines and anterior rays of dorsal ..	<b>Lutianus fulviflamma</b>
		No black blotch ..	<b>Lutianus rangus</b>
17	{	Two longitudinal bands, one through eye to caudal, the other below it ..	<b>Lutianus lemniseatus</b>
		Large blotch on caudal peduncle	<b>Lutianus decussatus</b>
		A white blotch on lateral line below anterior part of soft dorsal, preceded by a dark brown blotch ..	<b>Lutianus rivulatus</b>

#### Subfamily NEMIPTERINAE

1	{	Distinct backwardly directed spine on sub-orbital below eye, generally a few smaller spines below it ; no canine teeth	2
		No distinct spine on sub-orbital ; canines at least in upper jaw	5
2	{	3½ rows of scales between lateral line and median dorsal spines	3
		4½-5 rows of scales between lateral line and median dorsal	4
3	{	Lateral scales 42-44 ..	<b>Scolopsis vosmaeri</b>
		Lateral scales 48 ; two black blotches on lateral line ..	<b>Scolopsis bimaeculatus</b>
4	{	Lateral scales 43 ; distinct broad lateral band ..	<b>Scolopsis monogramma</b>
		Lateral scales 46-48 ; light longitudinal band on back ..	<b>Scolopsis phaeops</b>
5	{	Maxillary with a longitudinal strongly denticulated ridge	<b>Gnathodentex aurolineatus</b>
		Maxillary smooth without denticulated ridge ..	6

7	{	Flat molar teeth ..	<b>Monotaxis grandoculis</b>
		No molar teeth ..	7
7	{	Anal rays 7 or rarely 8 ..	8
		Anal rays 10-11 ..	<b>Gymnocranius griseus</b>
8	{	Canines in lower jaw as well as upper ..	<b>Nemipterus hexadon</b>
		Canines only in upper jaw ..	9
9	{	Membrane between dorsal spines deeply emarginate ..	<b>Nemipterus tolu</b>
		Membrane between dorsal spines not or only slightly emarginate ..	<b>Nemipterus japonicus</b>

Subfamily POMADASYNAE

1	{	Scales of moderate size ; lateral scales 44-60 ; 4-9 rows of scales between lateral line and median dorsal spines ; profile of head straight or convex ; central longitudinal groove behind the chin ..	2
		Scales small ; lateral scales 53-100 ; 10-19 rows of scales between lateral line and median dorsal spines ; profile of head concave ; no longitudinal groove ..	4
2	{	Lateral scales 55-60 ; 9 rows of scales between lateral line and median dorsal spines ; six longitudinal dark bands ..	<b>Pomadasys furcatus</b>
		Lateral scales 44-53 ; 4-6 scales between lateral line and median dorsal spines ..	3
3	{	Dorsal with a black blotch on spinous part ; back often with large transverse bands ..	<b>Pomadasys maculatus</b>
		Dorsal spotted ; body with longitudinal rows of spots or transverse bands ..	<b>Pomadasys hasta</b>
		Dorsal without spots. Body uniformly silvery ..	<b>Pomadasys argyreus</b>
4	{	Dorsal spines 14 and 15-16 rays ; body length 1.9-2.2 times height ..	<b>Plectorhynchus crassipina</b>
		Dorsal spines 11-13 ; dorsal rays 18-22 ; body length 2.5-3.0 times height ..	5
		Dorsal spines 9-10 and 23-26 rays ; body length 2.5-2.7 times height ; lateral scales 88-100 ..	<b>Plectorhynchus pictus</b>



5 {	Dorsal 12-13 spines and 20-22 rays ; lateral scales 85-90 ; 4-6 light longitudinal bands ; caudal striped or spotted ..	<b>Plectorhynchus lineatus</b>
	Dorsal spines 13 and rays 18 or 19 ; 3 longitudinal light bands, upper and middle bent downwards on head ; caudal irregularly banded ..	<b>Plectorhynchus albovittatus</b>
	Dorsal spines 13 and 17 rays ; 7-8 longitudinal bands, the upper ones continued on head ; caudal spotted ..	<b>Plectorhynchus cuvieri</b>
	Dorsal 13 spines and 18 rays or 14 spines and 17 rays ; lateral scales 80, body with irregular dark bands and patches ..	<b>Plectorhynchus orientalis</b>

Subfamily LETHRININAE

1 {	Less than 5 scales between lateral line and median dorsal spines ..	2
	5-5½ scales between lateral line and median dorsal spines ..	3
2 {	Lateral teeth in jaws conical ..	<b>Lethrinus variegatus</b>
	Posterior lateral teeth molar-like ..	<b>Lethrinus mahsena</b>
3 {	Lateral teeth in jaws conical and pointed ..	<b>Lethrinus miniatus</b>
	Posterior teeth in jaws molar like ..	4
4 {	Third <sup>anal</sup> dorsal spine as long as eye ..	<b>Lethrinus nebulosus</b>
	Third dorsal longer than eye ..	<b>Lethrinus ramak</b>

*Family LOBOTIDAE*

Body oblong ; mouth terminal with an oblique wide cleft reaching below eye ; 6 branchiostegals ; pseudobranchiae present ; gill membranes united ; dorsal continuous ; pectorals rounded ; ventrals thoracic ; caudal rounded ; 2 genera with 2 species.

{	Hindmost of anal spines longest	<b>Lobotes surinamensis</b>
	Second anal spine the longest ..	<b>Datnioides quadrifasciatus</b>

*Family SPARIDAE*

Oblong body ; pre and sub-orbital naked ; mouth somewhat protractile ; gill membranes free ; branchiostegals 5-7 ; teeth on palate ; dorsal fin single ; pectorals long and pointed.

- |   |   |                        |
|---|---|------------------------|
| 1 | Dorsal spines flexible, second to fifth prolonged into long filaments .. .. | <b>Sparus spinifer</b> |
|   | Dorsal spines rigid, none of them prolonged .. ..                           | <b>Sparus berda</b>    |

*Family SCIAENIDAE*

Body oblong to elongate; head with scales ; teeth in a villiform band ; no teeth on palate ; gill membranes separate ; pseudobranchiae large ; gill rakers present ; ventrals thoracic ; caudal rounded or wedge-shaped ; 4 genera with several species.

- |   |  |                                |
|---|--|--------------------------------|
| 1 | Mouth terminal, snout more or less pointed ; cleft of mouth oblique .. ..            | 2                              |
|   | Mouth inferior, snout bluntly rounded ; cleft of mouth more or less horizontal .. .. | 9                              |
| 2 | Lower jaw prominent .. ..  | 3                              |
|   | Jaws equal or upper slightly overlapping lower jaw .. ..                             | 4                              |
| 3 | Lateral scales 50-54 ; brownish red .. ..  | <b>Otolithes ruber</b>         |
|   | Lateral scales about 50 ; silvery .. ..  | <b>Otolithes argenteus</b>     |
| 4 | Second anal spine short and weak, length 1-1½ times diameter of eye .. ..            | 5                              |
|   | Second anal spine robust, length twice eye diameter .. ..                            | 7                              |
| 5 | Lower margin of eye, level with or, below commencement of gape of mouth .. ..        | <b>Pseudosciaena aneus</b>     |
|   | Eye above level of commencement of gape .. ..  | 6                              |
| 6 | Second anal spine opposite 14th dorsal ray ; border of snout entire .. ..            | <b>Pseudosciaena axillaris</b> |
|   | Second anal spine opposite 13th dorsal ray ; border of snout lobate .. ..            | <b>Pseudosciaena sina</b>      |

7	{	Dark blotches on back and fins . . . . .	<b>Pseudosciaena diacanthus</b>
		No dark blotches or bands . . . . .	8
8	{	5-6 rows of scales between lateral line and spinous dorsal ; dorsal rays 25-27 . . . . .	<b>Pseudosciaena coibor</b>
		About 9 rows of scales between lateral line and spinous dorsal ; dorsal rays 28-31 . . . . .	<b>Pseudosciaena soldado</b>
9	{	No barbel at mandibular symphysis . . . . .	10
		Barbel at mandibular symphysis . . . . .	12
10	{	Second anal spine weak and short . . . . .	11
		Second anal spine robust . . . . .	<b>Johnius maculatus</b>
11	{	Dorsal rays 25-28 ; anal spines 2, and anal rays 7 . . . . .	<b>Johnius carutta</b>
		Dorsal rays 28-30 ; anal spines 2 and rays 8 . . . . .	<b>Johnius dussumieri</b>
12	{	Barbel under symphysis of mandible robust, equal to half eye . . . . .	<b>Sciaena dussumieri</b>
		Barbel slightly shorter than eye . . . . .	<b>Sciaena russelli</b>
		Barbel short or vestigial . . . . .	<b>Sciaena macroptera</b>

*Family MALACANTHIDAE*

Body elongate, sub-fusiform ; mouth terminal ; scales small ; gill membranes united ; pseudobranchiae present ; branchiostegals 5-6 ; pectorals more or less pointed ; ventrals originating below dorsal and has an osseous spine ;

One genus and species . . . . . **Malacanthus latovittatus**

**Superfamily Cirrhitoidae**

*Family CIRRHITIDAE*

Simple rays of pectorals more or less thickened and produced ; mouth terminal ; dorsal with 10 spines and 11-17 rays ; anal with 3 spines and 6-9 rays ; no teeth on palatines .

One genus and one species . . . . . **Paracirrhites fosteri**

**Superfamily Labroidae**

*Family LABRIDAE*

Mouth protractile ; several rows of small granular teeth sometimes present on the inner side of jaws. Ten genera with several species.

{	Dorsal spines 11-13 . . . . .	<b>Bodianus</b>	Page 71
{	Dorsal spines 8-9 seldom 10 . . . . .	2	

2	{	Lateral line interrupted .. 3	
		Lateral line continuous .. 5	
3	{	Scales small ; lateral scales about 80 ; single species ..	<b>Cymolutes lecluse</b>
		Scales large ; lateral scales 20-30 ..	4
4	{	Third anal spine longer than second ..	<b>Cheilinus</b> Page 71
		Second anal spine longer than third ; one species ..	<b>Pseudocheilinus hexataenia</b>
5	{	Jaws with 2 large anterior forwardly directed incisivi compressed to form a cutting edge ; one species ..	<b>Anampses meleagrides</b>
		No incisivi ; anterior teeth pointed when large ..	6
6	{	Dorsal spines 8 ..	7
		Dorsal spines 9 ..	8
7	{	Snout produced and tubiform ..	<b>Gomphosus</b> Page 71
		Snout not produced ..	<b>Thalassoma</b> Page 72
8	{	Cheeks scaly ; one species ..	<b>Hemigymnus fasciatus</b>
		Cheeks naked or with a few scales only ..	9
9	{	Scales large ; lateral scales 25-30 ..	<b>Halichoeres</b> Page 72
		Scales small ; lateral scales 50-80 ..	<b>Coris</b> Page 72

Genus BODIANUS

{	Preoperculum scaly ..	<b>Bodianus diana</b>
	Preoperculum naked ..	<b>Bodianus bilunulatus</b>

Genus CHEILINUS

{	Dorsal spines 10 ..	<b>Cheilinus chlorurus</b>
	Dorsal spines 9 ..	<b>Cheilinus undulatus</b>

Genus GOMPHOSUS

1	{	Caudal semilunate, outer rays prolonged ; vertical fins yellowish ..	2
		Caudal truncate or rounded ; rays scarcely prolonged ; vertical fins dark ..	<b>Gomphosus varius</b>

- |   |   |                                  |    |                            |
|---|---|----------------------------------|----|----------------------------|
| 2 | { | Yellowish blotch behind head     | .. | <b>Gomphosus tricolor</b>  |
|   |   | above pectorals                  |    |                            |
| 2 | { | No yellow blotch ; body and head | .. | <b>Gomphosus coeruleus</b> |
|   |   | uniform colour                   |    |                            |

Genus THALASSOMA

- |   |   |                                   |    |                                 |
|---|---|-----------------------------------|----|---------------------------------|
| 1 | { | A scaly patch or a few scales on  | .. | 2                               |
|   |   | superior part of opercle          |    |                                 |
| 1 | { | No scales on head                 | .. | <b>Thalassoma amblycephalus</b> |
|   |   |                                   |    |                                 |
| 2 | { | Dark bands on body                | .. | 3                               |
|   |   | No bands on body                  |    |                                 |
| 2 | { | No bands on body                  | .. | <b>Thalassoma lunare</b>        |
|   |   |                                   |    |                                 |
| 3 | { | Body with dark broad transverse   | .. | <b>Thalassoma hardwicki</b>     |
|   |   | bands                             |    |                                 |
| 3 | { | Body with dark longitudinal       | .. | 4                               |
|   |   | bands                             |    |                                 |
| 4 | { | Spots and narrow stripes on head  | .. | <b>Thalassoma umbrostigma</b>   |
|   |   | Light colour covers upper part of |    |                                 |
| 4 | { | head and extends below to         | .. | <b>Thalassoma purpureum</b>     |
|   |   | sides of snout as a triangular    |    |                                 |
| 4 | { | prolongation                      | .. |                                 |
|   |   |                                   |    |                                 |

Genus HALICHOERES

- |   |   |                                   |    |                                 |
|---|---|-----------------------------------|----|---------------------------------|
| 1 | { | Few scales on upper part of       | .. | <b>Halichoeres centiquadrus</b> |
|   |   | opercle                           |    |                                 |
| 1 | { | No scales on head except for      | .. | 2                               |
|   |   | occiput                           |    |                                 |
| 2 | { | Dorsal and anal with a low scaly  | .. | 3                               |
|   |   | sheath                            |    |                                 |
| 2 | { | No scaly sheath for dorsal and    | .. | 4                               |
|   |   | anal                              |    |                                 |
| 3 | { | Caudal with dark bands            | .. | <b>Halichoeres marginatus</b>   |
|   |   | Caudal light without bands        |    |                                 |
| 3 | { | Caudal light without bands        | .. | <b>Halichoeres notopsis</b>     |
|   |   |                                   |    |                                 |
| 4 | { | Black blotch or ocellus on soft   | .. | <b>Halichoeres hyrtli</b>       |
|   |   | dorsal                            |    |                                 |
| 4 | { | No black blotch or dark ocellus.. | .. | <b>Halichoeres javanicus</b>    |
|   |   |                                   |    |                                 |

Genus CORIS

- |   |                      |    |                       |
|---|----------------------|----|-----------------------|
| { | Lateral scales 70-80 | .. | <b>Coris gaimardi</b> |
|   | Lateral scales 53-64 |    | <b>Coris aygula</b>   |

*Family SCARIDAE*

Mouth not protractile; maxillary firmly attached to premaxillary; jaws short forming a beak; teeth fused to form cutting edge; scales large; dorsal spines 10.

- |   |   |   |                             |
|---|---|---|-----------------------------|
| 1 | { | At least one scale or often a row of scales on inferior limb of preopercle .. 2 |                             |
|   |   | No scales on inferior limb of preopercle .. 4                                   |                             |
| 2 | { | Dorsal profile of head convex .. 3  |                             |
|   |   | Dorsal profile of head concave ..   | <b>Callyodon dussumieri</b> |
| 3 | { | Greyish bands and spots on head   | <b>Callyodon ghobban</b>    |
|   |   | Light band from corner of mouth to eye ..                                       | <b>Callyodon blochii</b>    |
| 4 | { | Teeth yellowish green ..  | <b>Callyodon oktodon</b>    |
|   |   | Teeth white or pinkish ..   | <b>Callyodon fosteri</b>    |

**Super family Pomacentroidae**

*Family POMACENTRIDAE*

Lateral line interrupted; dorsal fin single with well developed spinous portion; ventrals thoracic; branchiostegals 5-7; pseudobranchiae present; teeth feeble; palate edentulous.

- |   |   |  |                                  |
|---|---|--|----------------------------------|
| 1 | { | Scales small; lateral scales 50-80 .. 2  |                                  |
|   |   | Scales large; lateral scales 27-36 .. 4  |                                  |
| 2 | { | 19-25 rows of scales before dorsal   | <b>Amphiprion bicinctus</b>      |
|   |   | 12-16 rows of scale before dorsal .. 3   |                                  |
| 3 | { | Caudal dark bordered with white  | <b>Amphiprion polymnus</b>       |
|   |   | Caudal light .. ..   | <b>Amphiprion sebea</b>          |
| 4 | { | Teeth compressed, incisiform .. 6  |                                  |
|   |   | Teeth conical or villiform .. 5  |                                  |
| 5 | { | Second and third dorsal spines subequal in length; 4-5 rows of scales on preoperculum .. | <b>Daseyllus trimaculatus</b>    |
|   |   | Third dorsal spine 1.5 times length of second; 3 rows of scales on preopercle ..         | <b>Daseyllus aruanus</b>         |
| 6 | { | Hind border of preopercle serrated .. 7  |                                  |
|   |   | Hind border of preopercle smooth .. 8  |                                  |
| 7 | { | Suborbital scaly ..  | <b>Pomacentrus cyanomos</b>      |
|   |   | Suborbital naked ..  | <b>Pomacentrus notophthalmus</b> |

8	{	13 Dorsal spines .. 9	
		12 Dorsal spines ..	<b>Abudefduf lacrymatus</b>
9	{	3-4 rows of scales between lateral line and scaly sheath of dorsal opposite last spine .. 10	
		1½ or 2 rows of scales between lateral line and scaly sheath of dorsal opposite last spine ..	<b>Abudefduf biocellatus</b>
10	{	Scales on head up to nostrils ..	<b>Abudefduf septemfasciatus</b>
		Scales on head do not reach nostrils ..	<b>Abudefduf saxatilis-vaigiensis</b>

### Suborder TRACHINOIDEI

#### *Family PINGUIPEDAE*

Body elongate; lateral line single; dorsal single and long with few spines anteriorly; ventrals below or a little before pectorals; branchiostegals 6; pseudobranchiae present; one genus with two species.

{	Border of pre and subopercles serrated. caudal rounded ..	<b>Parapercis punctata</b>
	Border of preoperculum entire; caudal truncate, with its upper ray a little prolonged ..	<b>Parapercis pulchella</b>

### Suborder CALLIONYMOIDEI

#### *Family CALLIONYMIDAE*

Head and body nearly cylindrical, slightly depressed; scales absent; lateral line single; two dorsals, anterior with 2 or 4 spines; ventrals before pectorals; gill membranes joined to isthmus; gill opening only a small slit; pointed teeth in several rows in jaws.

One genus and species ..	<b>Callionymus sagitta</b>
--------------------------	----------------------------

### Suborder STROMATEOIDEI

#### *Family STROMATEIDAE*

Body ovate or oblong; scales small, deciduous; mouth small; palate and tongue rarely toothed; dorsal fin long; ventrals often absent; branchiostegals 5-7; one genus with two species

{	Caudal deeply forked ..	<b>Pampus argenteus</b>
	Caudal emarginate or feebly forked ..	<b>Pampus chinensis</b>

**Suborder SIGANOIDEI**

*Family SIGANIDAE*

Body oblong and compressed ; scales minute ; lateral line complete ; mouth small and terminal ; no teeth on palate or tongue ; dorsal with 13 strong spines and 10 soft branched rays ; anal with 7 spines and 9 rays ; ventrals originate behind pectorals ; one genus with four species.

- |   |   |   |  |
|---|---|---|--|
| 1 | { | Last dorsal spine longer than first ; soft dorsal and anal high .. .. . 2   |  |
|   |   | Last dorsal spine not longer than first one ; soft dorsal and anal low .. .. . 3  |  |
| 2 | { | 30-35 rows of scales between lateral line and median dorsal spines .. .. . <b>Siganus javus</b>                             |  |
|   |   | 18-24 rows of scales between lateral line and median dorsal spines .. .. . <b>Siganus stellatus</b>                         |  |
| 3 | { | 17-18 rows of scales between lateral line and median dorsal spines ; dark with light lines .. .. . <b>Siganus spinus</b>    |  |
|   |   | 20-23 rows of scales between lateral line and median dorsal spines ; brown spotted with white .. .. . <b>Siganus oramin</b> |  |

**Suborder ACANTHUROIDEI**

*Family ACANTHURIDAE*

Body oblong and compressed ; scales minute ; lateral line complete ; caudal peduncle with spines or bony plates on sides ; mouth small and terminal ; palate toothless ; one dorsal ; ventrals originate behind pectorals ; pseudobranchiae present ; 4 genera with several species.

- |   |   |  |  |
|---|---|--|--|
| 1 | { | Caudal peduncle with erectile spine ; 3 anal spines .. .. . 5                  |  |
|   |   | Caudal peduncle with bony bucklers each keeled or with a rigid spine .. .. . 2 |  |
| 2 | { | No horn or hump on forehead .. .. . <b>Naso lituratus</b>                      |  |
|   |   | A horn or hump on forehead .. .. . 3   |  |
| 3 | { | Compressed hump on forehead .. .. . <b>Naso tuberosus</b>                      |  |
|   |   | Horn like protuberance on forehead .. .. . 4                                   |  |
| 4 | { | Caudal lobes produced into filaments .. .. . <b>Naso unicornis</b>             |  |
|   |   | Caudal lobes not so produced .. .. . <b>Naso brevirostris</b>                  |  |
| 5 | { | Teeth movable ; dorsal spines 8-9 .. .. . <b>Ctenochaetus strigosus</b>        |  |
|   |   | Teeth immovable .. .. . 6  |  |



6	{	Dorsal spines 7-9 .. 7	
		Dorsal spines 3-5 ..	<b>Zebrasoma flavescens</b>
7	{	Ring of light colour around mouth ..	<b>Acanthurus leucosternon</b>
		No ring around mouth ..	8
8	{	Dorsal rays 22-23 ..	<b>Acanthurus triostegus</b>
		Dorsal rays 24-29 ..	9
9	{	Bands radiating from eye forming longitudinal bands on back ..	<b>Acanthurus lineatus</b>
		No such bands ..	10
10	{	Corner of mouth nearer to hind border of preopercle than to eye ..	<b>Acanthurus matoides</b>
		Corner of mouth equidistant from preopercle and eye ..	11
11	{	Head and body with dark lines ..	<b>Acanthurus bleekeri</b>
		Head and body uniformly coloured ..	<b>Acanthurus weberi</b>

### Suborder TRICHIUROIDEI

#### *Family TRICHIURIDAE*

Body greatly elongate and compressed ; dorsal single ; ventrals absent ; anal spine many and mostly small ; 1 genus with 2 species.

1	{	First anal spine well developed, length more than half eye diameter ..	<b>Trichiurus savala</b>
		First anal spine minute, same length as rest ..	<b>Trichiurus haumela</b>

### Suborder SCOMBROIDEI

#### *Family SCOMBRIDAE*

Body fusiform ; mouth rather large ; two dorsals ; finlets are present behind dorsal and anal ; caudal forked ; pectorals placed high ; 5 genera with several species.

1	{	Scales present at least in pectoral region ..	2
		Body naked or with rudimentary scales ..	6
2	{	Uniform scales covering whole body ..	<b>Rastrelliger kanagurta</b>
		Scales of pectoral region forming a corselet ; keel present on each side of tail ..	3

3	{	Body naked except for corselet .. 4	
		Body scaled throughout .. 5	
4	{	Origin of anal below second dorsal; longitudinal dark bands on belly ..	<b>Euthynnus (Katsuwonus) pelamis</b>
		Origin of anal slightly behind second dorsal; no dark bands on belly; dark blotches between pectorals and ventrals ..	<b>Euthynnus alletteratus affinis</b>
5	{	Second dorsal and anal falcate, their anterior rays longer than height of first dorsal fin ..	<b>Thunnus macropterus</b>
		Second dorsal about same height as first dorsal ..	<b>Thunnus tonggol</b>
6	{	No gill rakers; teeth triangular and slightly serrated ..	<b>Acanthocybium solandri</b>
		Gill rakers short; teeth large and pointed .. 7	
7	{	Vertical bands on body; gill rakers, 3-5 ..	<b>Scomberomorus commersoni</b>
		No vertical bands; gillrakers 8-10 .. 8	
8	{	Short horizontal bars on body ..	<b>Scomberomorus interruptus</b>
		Spots on body ..	<b>Scomberomorus guttatus</b>

*Family ISTIOPHORIDAE*

Body cylindrical and elongate; mouth large; teeth minute; two dorsals and two anals; no finlets behind dorsal and anal; ventrals reduced; scales present; longitudinal keels on each side of caudal peduncle.

1	{	Height of central rays of first dorsal exceed height of those at anterior end ..	<b>Istiophorus gladius</b>
		Height of central rays of first dorsal shorter than height of those at anterior end .. 2	
2	{	Height of central rays of first dorsal are equal to or at least half the height of those at anterior end .. 3	
		Height of central rays of first dorsal are shorter than half the height of those at anterior end 4	
3	{	Ventrals longer than pectorals ..	<b>Tetrapturus indicus</b>
		Ventrals shorter than pectorals ..	<b>Tetrapturus tenuirostratus</b>
4	{	First dorsal with 33-35 rays ..	<b>Makaira indica</b>
		First dorsal with more than 38 rays ..	<b>Makaira mitsukurii</b>

*Family XIPHIDAE*

Branched rays of dorsal absent posteriorly in adults ; second dorsal and anal vestigial ; rostrum elongate and depressed ; scales wanting in adult, present in young.

Single genus and species .. **Xiphias gladius**

**Suborder BLENNIOIDEI**

Body elongated and cylindrical ; dorsal and anal long ; ventrals when present jugular, seldom subthoracic ; scales when present are small ; pseudobranchiae present.

- |   |   |  |   |                                   |
|---|---|--|---|-----------------------------------|
| 1 | { | Large number (over 150) of teeth<br>in each jaw .. .. .                              | 2 |                                   |
|   |   | 45-50 teeth in lower jaw .. .. .   |   | <b>Ecsenius frontalis</b>         |
| 2 | { | Caudal rays unbranched or with<br>only 7 branched rays .. .. .                       |   | <b>Alticus saliens</b>            |
|   |   | Caudal with 9 deeply branched<br>rays .. .. .  | 3 |                                   |
| 3 | { | A few small teeth present on<br>vomer .. .. .  | 4 |                                   |
|   |   | No teeth on vomer .. .. .  | 5 |                                   |
| 4 | { | Nucal cirrus with 5-6 secondary<br>filaments, a few of which may<br>be bifid .. .. . |   | <b>Entomacrodus epalzeoehilos</b> |
|   |   | Nucal cirrus simple and filiform .. .. .   |   | <b>Entomacrodus striata</b>       |
| 5 | { | Nucal cirri which are bushy,<br>multifid .. .. .                                     |   | <b>Salarias fasciatus</b>         |
|   |   | Nucal cirri simple or absent .. .. .   |   | <b>Salarias edentulus</b>         |

**Class ELASMOBRANCHII**

Gill openings lateral ; anterior margin of pectoral free ; body more or less cylindrical .. .. . **PLEUROTREMATA** Page 80

Gill openings ventral ; anal fin absent ; anterior margin of pectoral fin joined to side of body or head, body depressed .. .. . **HYPOTREMATA** Page 78

**Superorder Hypotremata**

- |   |   |   |   |   |
|---|---|---|---|---|
| 1 | { | Body elongate and snout produced                | 2 |   |
|   |   | Body not elongate, laterally<br>widened .. .. . |   | 8 |

2	{	Snout toothed and bony ..	3	
		Snout normal and soft ..	5	
3	{	Caudal fin with a distinct lower lobe ..		<b>Pristis cuspidatus</b>
		No distinct lower caudal lobe ..	4	
4	{	Dorsal fin before ventrals ..		<b>Pristis perrotetti</b>
		Dorsal fin behind ventrals ..		<b>Pristis zysron</b>
5	{	First dorsal opposite ventrals ..	6	
		First dorsal well behind ventrals ..	7	
6	{	Rows of large tubercles and spines on head and trunk ..		<b>Rhynchobatus anchylostomus</b>
		Only a few tubercles and spines ..		<b>Rhynchobatus djeddensis</b>
7	{	1 skiny flap on hind margin of opercle ..		<b>Rhinobatus halavi</b>
		2 skiny flaps ..		<b>Rhinobatus columnae</b>
8	{	No prominent electric organs on body ..	9	
		Large electric organs on body ..		<b>Narcine tinglei</b>
9	{	Snout normal ..	10	
		Snout produced as a fleshy flap on each side ..		<b>Mobula eregodoo-tenkee</b>
10	{	Head elevated above pectorals ..	11	
		Head not elevated ..	15	
11	{	Head expanded as a thick flap in front on the ventral side ..	12	
		Lower part of head not extended ..	13	
12	{	9 series of teeth in upper jaw ..		<b>Rhinoptera adpersa</b>
		7 series of teeth in upper jaw ..		<b>Rhinoptera javanica</b>
13	{	1 row of teeth ..		<b>Stoasodon narinari</b>
		3 or more rows of teeth ..	14	
14	{	Body smooth ..		<b>Myliobatis nieuhoffi</b>
		A row of small tubercles in median line of the scapular region ..		<b>Myliobatis maculatus</b>
15	{	Tail long, spineless ..		<b>Urogymnus asperrimus</b>
		Tail long, armed with serrated spines ..	16	
16	{	Body much wider than long ..		<b>Pteroplatea micrura</b>
		Body about as wide as long ..	17	
17	{	Tail compressed, ribbon like ..		<b>Taeniura lymna</b>
		Tail cylindrical tapering ..	18	
18	{	Tail less than twice as long as body ..	19	
		Tail more than thrice as long as body ..	20	

19	{	Body about as broad as long ; snout pointed ..	<b>Trygon walga</b>
		Body broader than long ; snout obtuse ..	<b>Trygon kuhlii</b>
20	{	Body about as broad as long ; snout pointed ..	<b>Dasyatis uarnak</b>
		Body broader than long ; snout obtuse ..	<b>Dasyatis sephen</b>

### Superorder Pleurotremata

1	{	Nictating membrane present ..	2
		Membrane absent ..	7
2	{	Head normal ..	3
		Head hammer shaped ..	<b>Sphyrna zygaena</b>
3	{	Teeth more or less triangular in shape ..	4
		Teeth numerous in flat pavement	<b>Mustelus manazo</b>
4	{	Spiracles absent ..	5
		Small spiracles present ..	<b>Galeocardus tigrinus</b>
5	{	Edges of teeth strongly serrate ..	6
		Edges of teeth smooth ..	<b>Scoliodon palsorrah</b>
6	{	Pectoral tip dusky ..	<b>Eulamia melanoptera</b>
		Pectoral tip not dusky ..	<b>Eulamia dussumieri</b>
7	{	Last gill slit in front of pectoral	12
		Last gill slit over or behind pectoral ..	8
8	{	One or more keels on each side of caudal peduncle ..	<b>Rhincodon typus</b>
		Peduncle not keeled ..	9
9	{	Caudal about $\frac{1}{2}$ total length ..	<b>Stegostoma tigrinum</b>
		Caudal about $\frac{1}{3}$ total length ..	<b>Chiloseyllium indicum</b>
10	{	No keel on caudal peduncle ..	11
		A keel present on peduncle ..	<b>Lamna spallanzani</b>
11	{	All teeth with smooth edges ..	12
		Teeth coarsely serrated ..	<b>Carcharias ellioti</b>
12	{	Bases of teeth in upper jaw serrated ..	<b>Carcharias macloti</b>
		Bases of teeth smooth ..	13
13	{	Groove at angle of mouth does not extend to upper jaw ..	14
		Groove extends to upper jaw ..	<b>Carcharias walbehmii</b>
14	{	Pectoral does not extend to below dorsal ..	<b>Carcharias laticaudus</b>
		Pectoral extends to below dorsal	<b>Carcharias acutus</b>

## CATALOGUE

THE keys at the front of this bulletin help in discovering the scientific names of fish. Each fish has been assigned a catalogue number which may be discovered by reference to one of the indices at the back of the bulletin. By reference to what is said about the fish in the catalogue itself, further information may be obtained.

It shows the different scientific names (synonyms) by which each fish has been referred to, and by whom, where and when these descriptions were provided. To do this concisely certain conventions and abbreviations have been resorted to. Following the name of the author who wrote about the species, there is data indicating the year and publication of his writing. Sometimes the date is preceded by contracted titles of journals and by figures which indicate the volume, part numbers and paginations of sections applicable to the species. These can be readily noted by reference to the bibliography which composes part of this bulletin.

Abbreviations have been used to denote the publication e.g. *Chanos salmoneus* Willey, G 18, 1909, means that Willey makes a reference to *Chanos chanos* as *Chanos salmoneus* in his Administration Report of the Marine Biologist for 1909 on page G 18 (Refer to bibliography under Willey).

The scientific names in the catalogue are given in heavy type. The common English names are given immediately following the scientific name. Sinhalese names appear in italics on the left and the Tamil names on the right below the scientific name.

The nomenclature of the Orders, Families and other groups are arranged according to authorities who have worked on this subject (Berg 1947 and Welander 1949). The same type of information appears, a little more concisely, in the systematic synopsis of the catalogue which follows the catalogue proper. Freshwater species are marked with an \* immediately before the number in the synopsis.

## Class TELEOSTOMI

### Order Clupeiformes

#### Family ELOPSIDAE

1. **Elops hawaiiensis** T. Regan. Giant herring, Ten-pounder

*Mannava, Ranava*

*Manna*

*Elops saurus* Tennent, 362, 1868 ; *Elops saurus* Willey, G 18, 1909 ; *Elops saurus* Malpas, C. J. S. (C), 2 : 82, 1926 ; *Elops indicus* Deraniyagala, C. J. S. (C) 5: 1933 ; *Elops saurus* Deraniyagala, Atlas, 8, 1952.

2. **Megalops cyprinoides** (Brouss.). Ox-eyed herring

*Illeya, Mareva*

*Marau*

*Megalops kundinga* Tennent, 362, 1868 ; *Megalops cyprinoides* Day, 650, 1878 ; *Megalops cyprinoides* Willey, G 18, 1909 ; *Megalops cyprinoides* Dunker, 69, 1912 ; *Megalops cyprinoides* Deraniyagala, C. J. S. (C), 5 : 83, 1933 ; *Megalops cyprinoides* Mendis, L 25, 1951 ; *Megalops cyprinoides* Deraniyagala, Atlas 9, 1952.

#### Family ALBULIDAE

3. **Albula vulpes** (L.). Bone fish, Lady fish

*Vauva, Miya*

Deraniyagala, C. J. S. (C), 5 : 83, 1933 ; Deraniyagala, Atlas 9, 1952.

#### Family CHANIDAE

4. **Chanos chanos** (Forsk.). Hyder's fish, Milk fish

*Vaikka*

*Pal meen*

*Chanos salmoneus* Willey, G 18, 1909 ; *Chanos salmoneus* Dunker, 70, 1912 ; *Chanos chanos* Deraniyagala, C. J. S. (C), 5 : 82, 1933 ; *Chanos chanos* Mendis, L 25, 1951 ; *Chanos chanos* Deraniyagala, Atlas 11, 1952.

#### Family CHIROCENTRIDAE

5. **Chirocentrus dorab** (Forsk.). Dorab, Wolf herring

*Podi katuvalla, Panu katuvalla,*  
*Rat katuvalla*

*Tuppu vallai, Mullu vallai, Kallaku*  
*vallai, Kuru vallai*

Tennent, 361, 1868 ; Malpas, C. J. S. (C), 2 : 33, 1926 ; Deraniyagala, C. J. S. (C), 5 : 82, 1933 ; Mendis, L 25, 1951 ; Deraniyagala, Atlas 10, 1952.