

1.2 Plan of the Catalogue

Four clupeoid families are presented: Chirocentridae, Clupeidae, Pristigasteridae and Engraulididae. For each family are given general descriptive remarks, notes on biology and fisheries, and a key to the subfamilies and genera. Thereafter, the genera are given in the same sequence as in the family (or subfamily) key, but the species within them are arranged alphabetically. For each genus a brief diagnosis is given which supplements the data in the key; also references to junior synonyms (some of which may still be in current use or entrenched in the older literature), notes on biology and fisheries, and a brief reference to the number of species, particular taxonomic problems, and any major revisional studies. Keys are not given to species since in many cases existing keys are unwieldy (especially in large genera such as *Sardinella*, *Thryssa* and *Anchoa*) or in need of further refinement; however, the species diagnoses contain comparisons with most species likely to be confused in the area. The information given for each species is arranged in the following paragraphs:

- (1) **Scientific Name** : Reference is given to the first valid name applied to the species and its accompanying description; also, the type locality. Earlier but invalid names appear in the synonyms (where necessary).
- (2) **Synonyms** : All names that have been applied to the species are given, as well as some different name combinations (if significant) with author, date, page number and usually a comment in parenthesis. The complete synonymies (i.e. all reference in the literature) of some clupeoid species are enormous and no purpose would be served in citing them in full; in any case, there is often grave doubt whether the material studied was really indentified correctly. Where possible, one or more references at the end of each synonym give the correct name and the author(s) who correctly described the species, discussed its synonyms or provided distributional or other data.
- (3) **FAO Names** : Only English names have been chosen for use within FAO and to serve as the recommended names for fishery, marketing and other purposes. Some French and Spanish equivalent names for clupeoid fishes have already been given on FAO Identification Sheets, but it is considered premature to attempt this for all clupeoid species until fishery and other specialists in countries using French and Spanish can be consulted.
- (4) **Diagnostic Features** : Distinctive features are given, accompanied where necessary by diagrams, as an aid to identifying species within a genus (after using the keys to families, subfamilies and genera). If the species is more fully described by on FAO Species Identification Sheet, reference is made at the end to the alpha-numerical FAO code of the species and the Fishing Area (e.g. 'see CLUP Spratel 2, Fishing Area 51' in the case of *Spratelloides gracilis*). In principle, the species is diagnosed to separate it from similar sympatric species and not from all other species in the genus (i.e. those that occur in other areas).
- (5) **Geographical Distribution** : The general range of the species is given in the text and in the map (areas between scattered records may merit a question mark if a continuous range seems doubtful). Where appropriate, the list of species given after each genus is arranged geographically.
- (6) **Habitat and Biology** : The true identity of the species is often in doubt, especially in the older literature, so that much apparently useful biological information has had to be omitted here. For very many of the tropical species, however, almost nothing is known of feeding habits, spawning reasons, migrations, tolerances and preferences for particular temperature or salinity ranges, etc.
- (7) **Size** : The maximum known size and where possible the usual adult size are given (as standard length, in centimetres). As a rule the average adult size is generally about 1/4 less than the maximum.
- (8) **Interest to Fisheries** : Partly based on the statistics by species and by Fishing Area given in the FAO Yearbook of Fishery Statistics for 1983. Since only 47 clupeoid species (out of over 300 described species) are given individual statistics, and since identifications are sometimes doubtful (i.e. more than one species probably included), only a general impression of the relative importance of a species is possible in many cases, or reference to a particular locality where significant catches were seen or reported. However, from fisheries literature for particular areas or particular species considerable information on size of fishery, gear and utilization is available. This has been included whenever identifications can be trusted.
- (9) **Local Names** : These are only occasionally given, usually when a particular species is the basis for a major fishery and its identity is certain. In very many cases, however, a local name is applied to several clupeoid species and means no more than that the fish is a kind of sprat, sardine or anchovy.
- (10) **Literature** : Reference is made to the most important (not only taxonomic) books or papers on the species, with a brief indication of their relevance in parentheses. Some or all may already have been cited under the synonyms, where the page reference is also given. See page 14 for list of major works.

- (11) **Remarks** : Taxonomic or other problems are outlined here, e.g. explanations for unexpected name changes, doubtful status of species, indications of further work in progress or needed, and presence of subspecies (which are given a brief diagnosis and geographical range).

1.3 Problems of Identification

Many clupeoid species, especially those of tropical and subtropical waters where diversity is greatest, are difficult to identify, partly because the distinctions require a microscope or good hand lens (for gillraker numbers, shape of second supra-maxilla, form of scale striae, etc.), and partly because the taxonomy of some genera is not sufficiently well understood (e.g. the clupeid genera Sardinella and Herklotsichthys, or the engraulid genera Thryssa, Anchoviella and especially Anchoa).

The keys to families, subfamilies and genera have been based, where possible, on the most obvious external characters, but the longer generic keys (e.g. for the Clupeinae) may pose problems. However, since rather few genera are shared between the Indo-West Pacific and the New World, the distribution of the genera has often been introduced into the key. The elimination of genera (and species) not found within the area studied can often save time and side-step difficulties over unfamiliar characters. For this reason the occurrence of genera and species within the 19 marine and 9 freshwater FAO Fishing Areas is given (see Part 2). Having arrived at a particular genus by using the key, its occurrence in the area studies should be checked. This list will also help in narrowing down the number of species diagnoses that should be consulted, although this can also be done from the list of species given after each generic diagnosis.

Assuming that the correct genus has been found, a quick glance at the illustrations may suggest one or more likely species, especially if the shape or colour pattern is distinctive. The species diagnoses are designed to lead to the correct species or even genus, based on comparisons with similar species or genera sharing even a small part of the geographical range. However, the similarities of preserved specimens (on which many of the diagnoses are based) may be quite different from the similarities of fishes still in the net. It is as well, therefore, to check all the characters in the diagnosis of the compared species (or genus), where additional characters will be found.

Short-cuts to clupeoid identifications are regrettably few. Colour is generally of little help, but some clupeoids have characteristic black spots along the flanks (Sardina, Sardinops, Ambligaster sirm, some Herklotsichthys, some shads), and others have black tips to the tail (e.g. Sardinella melanura or a bright silver stripe on the flank (Lile and some anchovies).

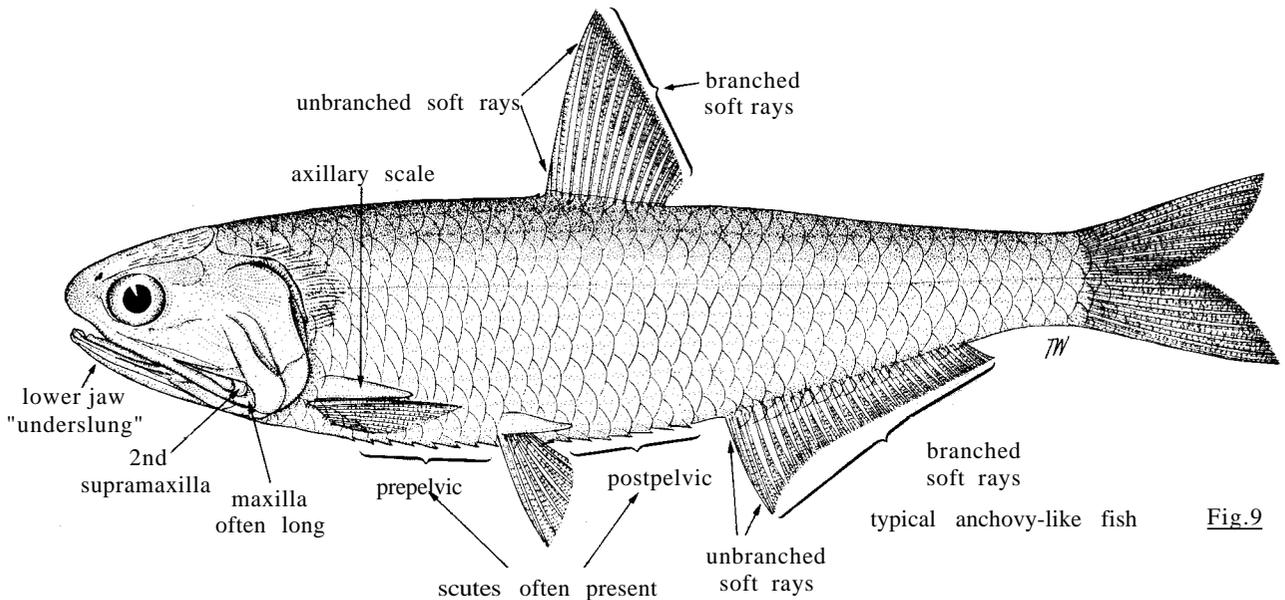
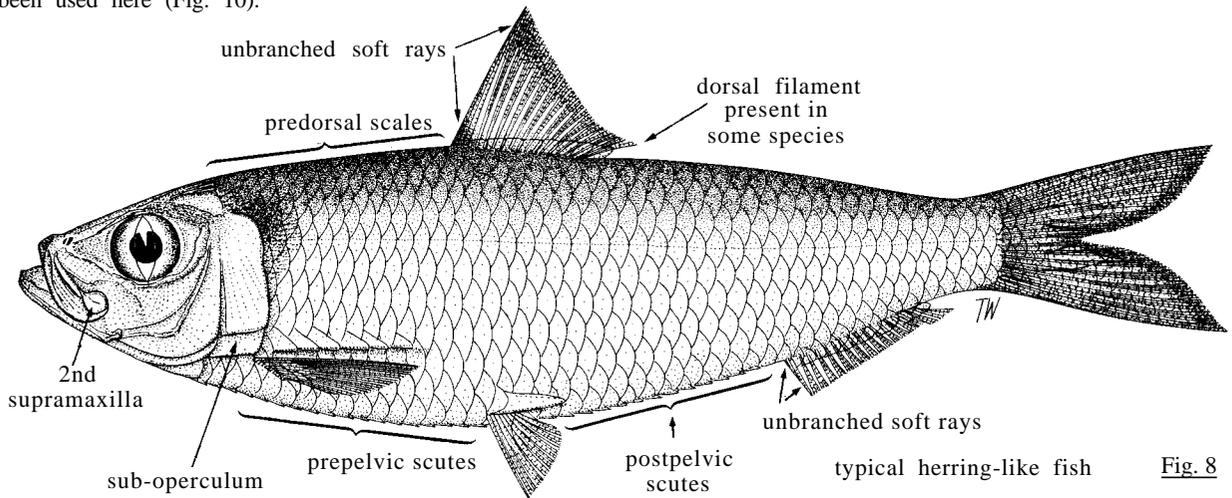
Among clupeids the number of pelvic finrays is often diagnostic of a genus or subfamily (but in anchovies there are always 7 finrays, except in Coilia ramcarati with 10). In the table below the counts are given for all clupeoids. A few characters may instantly diagnose certain species or genera, such as the canine teeth of Chirocentrus, Lycengraulis and Lycotrissa, the light organs of Coilia dussumieri, the rat-tail body of all Coilia or the enormously long upper jaw (maxilla) in Thryssa setirostris, but for the most part one must rely on tedious counts of finrays, gillrakers and scales, measurements of body proportions, and examination of small body parts. Much of the confusion in clupeoid literature is because workers did not always do this in the past.

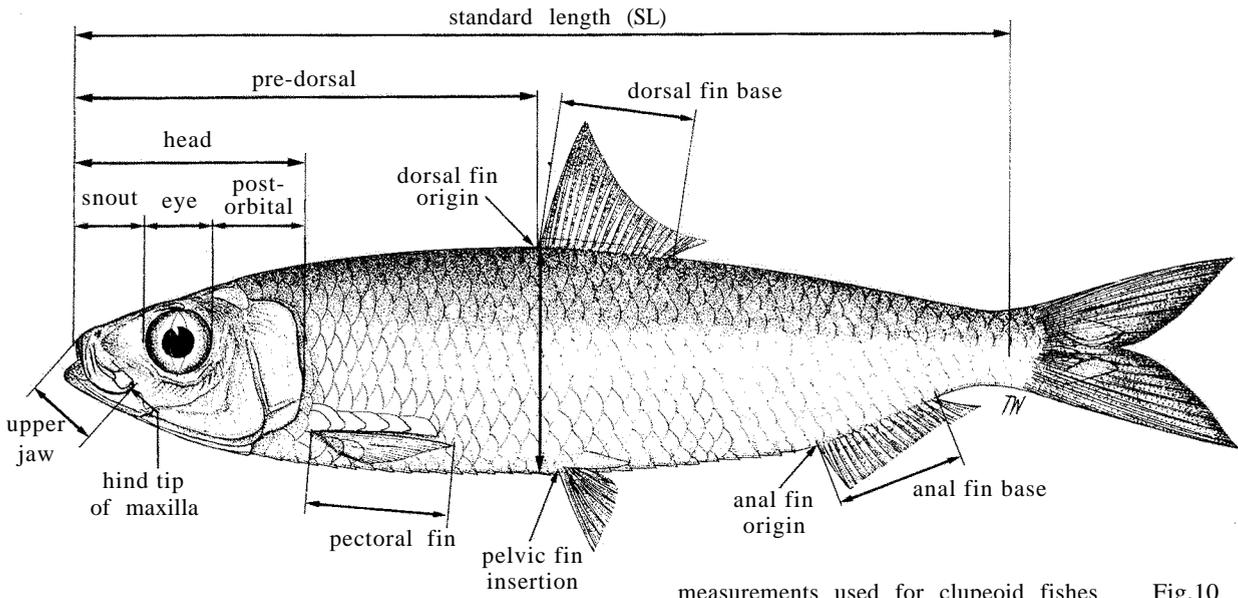
Family	Pelvic finrays	Genera
CHIROCENTRIDAE	7	<u>Chirocentrus</u>
CLUPEIDAE		
(Dussumieriinae)	8	<u>Dussumieria</u> , <u>Etrumeus</u> , <u>Spratelloides</u> , <u>Jenkinsia</u>
(Clupeinae)	7 7 or 8 8	<u>Platanichthys</u> , <u>Ramnogaster</u> , <u>Escualosa</u> <u>Sprattus sprattus</u> All other <u>Sprattus</u> : <u>Harengula</u> , <u>Herklotsichthys</u> , <u>Opisthonema</u> , <u>Lile</u> , <u>Sardina</u> , <u>Sardinops</u> , <u>Rhinosardinia</u> , <u>Clupeonella</u> , <u>Amblygaster</u> , <u>Strangomera</u> , most <u>Sardinella</u>
	9	<u>Sardinella aurita</u> , <u>S. brasiliensis</u> , <u>S. lemuru</u> , <u>S. longiceps</u> , <u>S. neglecta</u> ; <u>Clupea</u> (occasionally 8 or 10)
(Pellonulinae)	7 7 or 8 8	<u>Sierrathrissa</u> , <u>Clupeichthys perakensis</u> <u>Thrattidion</u> All other <u>Clupeichthys</u> all other genera
(Alosinae)	7 8 9	<u>Brevoortia</u> , <u>Ethmidium</u> <u>Ethmalosa</u> , <u>Hilsa</u> , <u>Tenualosa</u> , <u>Gudusia</u> <u>Alosa</u>
(Dorosomatinae)	8	All genera

Family	Pelvic finrays	Genera
PRISTIGASTERIDAE	6 6 or 7 7 (absent)	<u>Chirocentron</u> ; <u>Pellona harroweri</u> <u>Ilisha</u> <u>Pellona</u> <u>Pliosteostoma</u> , <u>Odontognathus</u> , <u>Neopisthopterus</u> , <u>Opisthopterus</u> , <u>Raconda</u> ; some specimens of <u>Pristigaster</u> (if present, then 5)
ENGRAULIDIDAE		
(Engraulidinae)	7	All genera
(Coilinae)	7 10	<u>Coilia</u> (except one species) <u>Coilia ramcarati</u>

1.4 Technical Terms, Measurements and Counts

A typical herring and a typical anchovy are shown in Figs 8 and 9. In many taxonomic works on clupeoids a large number of external features are given, either as percentages or in the older literature as proportions of standard length, or of head length; in some cases one body part can be expressed as x times larger than another (or contained x times within it). Of such proportional measurements, the following are the most useful and have been used here (Fig. 10).





measurements used for clupeoid fishes **Fig.10**

Standard Length - tip of snout to end of body, i.e., to base of caudal fin (where the finrays reach the hypurals). Bending the tail produces a wrinkle at this point.

Body depth - measured at deepest point, usually under origin of dorsal fin. Fishes are described here as slender when the depth is less than about 25% of standard length; moderately slender at 25 to 30% of standard length; moderately deep at 30 to 35%; deep at 35% or more.

Head length - the longest possible measurement, from tip of snout to hind border of gill cover (thus not always a horizontal measurement).

Snout versus eye - tip of snout to front border of eye, compared with the horizontal diameter of the eye. Most usefully expressed as the one larger than the other.

Upper jaw - from tip of snout to hind tip of maxilla, but most often expressed as the point reached by the maxilla, e.g. to beyond hind border of eye, to hind border of gill cover, etc.

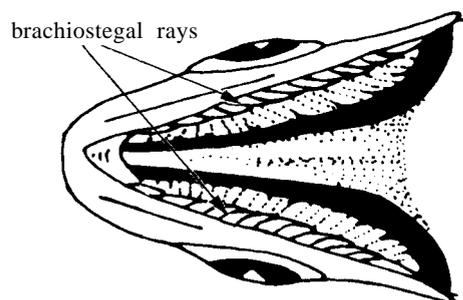
Post-orbital - from hind border of eye to hind border of gill cover, the longest measurement (thus not always horizontal).

Fin positions - the origins of the dorsal and anal fins, and the insertions of the pectoral and pelvic fins (their vertical position along the axis of the body) are either compared relative to each other, e.g. pelvic fin insertion in advance of dorsal fin origin, anal fin origin behind dorsal fin base); or given as a pre-pectoral, pre-dorsal, pre-pelvic or pre-anal distance (percent of standard length or for the dorsal origin often given as before or behind midpoint of body

Fin bases - the distance between the first and last finray bases. Rather than give finray numbers, it is often easier to state that the anal fin base is longer (or shorter) than the dorsal fin base

Finrays - in the dorsal and anal fins the first two, three or four finrays are unbranched (the first very small and easily missed), the remainder being branched (the last sometimes branched near its base, thus appearing as two, but counted as one). The first pectoral and pelvic finrays are also unbranched. The counts are given in the form iii 12 to 15 or i 17, etc., to indicate unbranched and branched finrays. This eliminates doubts about the first often minute unbranched finray since the first branched finray is always obvious.

Branchiostegal rays- these support the gill membrane that seals the underside of the gill cavity. Since the membranes on each side are not joined in the middle (except in the anchovy *Cetengraulis*), they tend to cling to the gill cover when this is opened up and so must be pulled inward to expose the branchiostegal rays. However; most clupeoids have about 6 or 7 branchiostegal rays, so that the high number in round herrings (11 to 17) is fairly obvious (Fig. 11).



underside of head

Fig.11

Gillrakers - unless stated otherwise, these are the numbers of gillrakers on the lower half of the first gill arch, i.e. on the ceratobranchial, which are much easier to count than those on the upper half, i.e. on the epibranchial bone. At the angle of the arch the curved bases of the gillrakers show whether they belong to the upper or the lower series (Fig. 12).

Scales - there are no pored lateral line scales along the flank, but a count of scales along the midline of the flank (in lateral series) is sometimes diagnostic. However, since clupeoids often lose their scales, this has been avoided wherever possible and reference merely made to the presence of very small or very large scales.

Scutes - all clupeoids (except *Chirocentrus*) have a pelvic scute immediately in front of the pelvic fins. In most clupeoids the scutes continue forward to the gill opening to form the pre-pelvic series (including the pelvic scute); behind the pelvic scute is a small scute between the pelvic fins and this is the first of the post-pelvic series. Counts are usually given in the form 13 or 14 + 10 to 12, or sometimes 13 or 14 + 10 to 12 = 23 to 26 to indicate pre-pelvic, post-pelvic and total scutes (Fig. 13). In a few species scutes are present on the back, from the origin of the dorsal fin forward to the head.

Many other and often small characters are used in the keys and diagnoses, but are illustrated at the appropriate place. Wherever possible, non-technical terms are used, e.g. gill cover, gill opening, upper jaw, lower part of gill arch, etc., unless specific reference must be made to the operculum, maxilla, epibranchial gillrakers, etc. Similarly, terms like anterodorsal or posteroventral have been avoided.

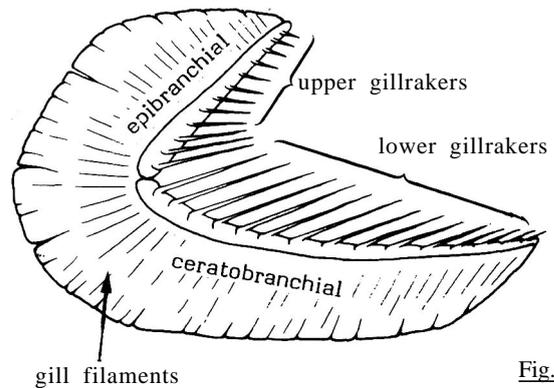


Fig. 12

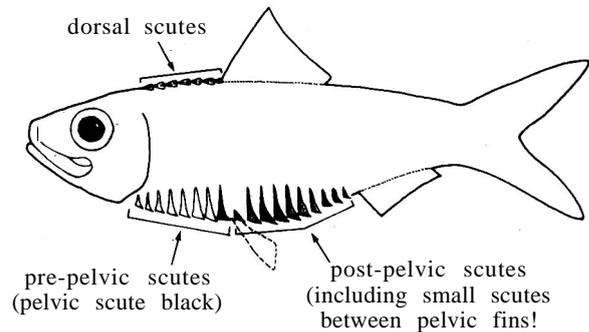


Fig. 13

1.5 Literature

The taxonomic, biological and fishery literature on clupeoid fishes is enormous. For example, over five hundred books, papers and reports up to 1984 contain data on merely the 11 species of clupeoids occurring off the western coasts of Africa. If this is multiplied up for more than three hundred species of clupeoid fishes in the world, then nearly seventeen thousand books, articles and reports have made some contribution to our knowledge of these fishes. In several geographical areas, however, attempts have been made to summarize these data. These major reference works have been cited in the synonymies in order to show where the taxonomy has now changed and different names are applicable; such works often contain valuable biological information, which may not have been significantly updated in the last two or three decades. In addition to these works, the biologist or fishery worker can also use the FAO Identification Sheets in five major fishing areas. Since identification of clupeoid species is simplified by elimination of those not found in the area under study, the major reference works and Identification Sheets are listed here by geographical area.

A. INDO-WEST PACIFIC

1. General (excluding cool-water species of Japan and Australia)

Wongratana, T., 1980. Systematics of clupeoid fishes in the Indo-Pacific region. Ph.D. thesis, Imperial College of Science and Technology, London, 2 vols. Keys, diagnoses, line drawings, maps, meristic counts for 154 species. The clupeoid worker's vade mecum, but still unpublished. The 24 new species and one new name were published in Jap.J.Ichthyol., 29(4):385-407, 25 figs (1983).

2. Western Indian Ocean (Area 51)

FAO Species Identification Sheets for Area 51, 5 vols, 1984. Clupeoids by P.J.P. Whitehead and T. Wongratana. Keys, diagnoses and biological and fishery notes for 42 clupeoids (all illustrated).

- SFSA. Sea fishes of southern Africa (in press). A totally revised edition of J.L.B. Smith's classic work. Keys, diagnoses, line drawings for 18 clupeoid species (all illustrated), by P.J.P. Whitehead and T. Wongratana.
3. Northern and Central Indian Ocean (Areas 51, 57 - in part)

Whitehead, P.J.P., 1973. A synopsis of the clupeoid fishes of India. J.mar.biol.Assn India, 14(1):160-256. Keys, line drawings, literature for 68 clupeoid species; still useful, but in part superceded by Wongratana's thesis (see item A 1 above).
 4. Eastern Indian ocean, Western Central Pacific (Areas 57, 71)

FAO Species Identification Sheets for Areas 57, 71, 4 vols., 1974. Clupeoids by P.J.P. Whitehead. Keys, diagnoses and biological and fishery notes for 40 clupeoids (all illustrated); much of it superceded by Wongratana's thesis (see item A 1 above).
 5. Northwest Pacific (Area 61)

Warm-water species included in Wongratana's thesis, but there is no modern work devoted to the clupeoids of China, the Koreas and Japan.

Svetovidov, A.N., 1963. Fauna of the USSR. Fishes, 2(1), Clupeidae. Zool.Inst.Acad.Sci.USSR, new series No. 48, published for the National Science Foundation by the Israel Program for Scientific Translations, Jerusalem, 428 pp. (English translation from 1952 Russian original). Keys, half-tone figures, line drawings, literature for 6 clupeoids from Area 61.
 6. Southwestern Pacific (Area 81)

No modern work on all the clupeoids of New South Wales and New Zealand. Munro (1956) described and figured 40 Australian clupeoids, but in many cases the names given must be updated from Wongratana's thesis (see item A 1 above).

B. EASTERN PACIFIC

1. General. No single modern work on the clupeoids of this region.
2. Northeastern Pacific (Area 67)

Clemens, W.A. & G.V. Wilby, 1967. Fishes of the Pacific coast of Canada, 2nd ed., Bull.Fish.Res.Bd Can., (68):1-443. Descriptions, photographs, biological data for the four clupeoid species from this area (pp. 99 to 105).

Hart, J.L., 1973. Pacific fishes of Canada. Bull.Fish.Res.Bd Can., (180):1-740. Keys, descriptions, line drawings, biological data and bibliography (extensive) for the four clupeoid species from this area (pp. 94-106). One of the best works of its kind.
3. Eastern Central Pacific (Area 77)

(California)

Miller, D.J. & R.N. Lea, 1972. Guide to the coastal marine fishes of California. Fish Bull.Calif., (157):1-235. Illustrated keys, brief descriptions and distribution notes for the 12 clupeoids of this area (pp. 54-57).

(Mexico to Panama)

Anon., 1976. Catalogo de peces marinos Mexicanos. Secretaria de Industria y Comercio, Instituto Nacional de Pesca, Mexico, 462 pp. Keys, distribution notes and photographs for 8 Pacific coast clupeoids of Mexico (pp 67-70, figs 60-75).

Meek, S.E. & S.F. Hildebrand, 1923. The marine fishes of Panama. Publs Field Mus.nat.Hist. (zool.Ser.), 15(215), Pt 1:1-330. Keys, descriptions and a few illustrations of 22 Pacific coast clupeoids of Panama (pp. 179-214). Nomenclature outdated, but useful in conjunction with Peterson (see below).

Peterson, C.L., 1956. Observations on the taxonomy, biology, and ecology of the engraulid and clupeid fishes of the Gulf of Nicoya, Costa Rica. Bull-inter-Am.trop.Tuna Commn., 1(5):137-280. Keys, distribution and biological notes for 23 Pacific coast clupeoids of Costa Rica. The best general work for this region, but lacks illustrations.

(Ecuador to Peru)

Cobo, M. & S. Massay, 1969. Lista de los peces marinos del Ecuador. Boln cient.tecn.Inst. nac.Pesc.Ecuador, 2(1):1-68. List of 22 clupeoids (7 illustrated) from Ecuador coasts; the nomenclature usefully updates that of Meek & Hildebrand (Panama) and Hildebrand (Peru).

Hildebrand, S.F., 1946. A descriptive catalogue of the shore fishes of Peru. Bull.U.S.natn. Mus., (189):1-530. Keys and descriptions of 14 clupeoids (6 illustrated) from Peruvian coasts (pp. 80-105). Still the most useful work for this region.

4. Southeastern Pacific (Area 87)

Much of the older Chilean literature is assembled by Delphin (1901:39-42 for clupeoids) and by Fowler (1945:1-6 for clupeoids), but there are no keys and the nomenclature is outdated; the same applies to Mann (1954).

Bore, R. & F. Martinez, 1981. Chilean fisheries resources catalogue. Corporación de Fomento de la Producción, Instituto de Fomento Pesquero, Chile, unpagued. Descriptions and biological and fishery notes for 4 clupeoids (all with excellent colour photographs) of this region.

De Buen, F., 1958. Peces de la superfamilia clupeoidae en las aguas de Chile. Revta Biol. Mar., 8(1-3):83-110. Keys and descriptions of all five clupeoids (no illustrations) of this region.

Leible, M. & E. Alveal, 1982. Catalogo de peces que habitan las aguas costeras y dulceacuicolas en la provincia de Concepcion. Pontificia Universidad Catolica de Chile, Departamento de Biología y Tecnología del Mar, Talcahuano, 104 p. Keys, descriptions, biological and fishery notes for four clupeoids (all illustrated) of this region (pp. 12-21).

C. WESTERN ATLANTIC

1. General. No single modern work on the clupeoids of this region.

2. Northwestern Atlantic (Area 21)

FWNA Fishes of the western North Atlantic, 1964. Sears Foundation for Marine Research, Yale University, Memoir 1 (3), 630 p. Keys, diagnosis and biological and fishery notes for 79 clupeoids (all illustrated) for this region and the northern part of Area 31 (pp. 148-454, authors S.F. Hildebrand, L.R. Rivas and R.R. Miller). In parts outdated, but still an excellent guide.

Liem, A.H. & W.B. Scott, 1966. Fishes of the Atlantic coast of Canada. Bull.Fish.res. Bd Can., (155):1-485. Keys, descriptions and biological and fishery notes for 7 clupeoids (all illustrated) of this region.

3. Western Central Atlantic (Area 31)

FWNA, 1964 (see item C 2 above), which covers also the northern part of this area.

Cervigón, F., 1966. Los peces de Venezuela, 2 vols, Fondo de Cultura Cientifica, Caracas. Keys and descriptions for 28 clupeoids (12 illustrated) from this region (pp. 114-149 and 925-926).

Whitehead, P.J.P., 1973. The clupeoid fishes of the Guianas. Bull.Br.Mus.nat.Hist.(Zool.), Suppl. 5:1-227. Keys and descriptions of 37 clupeoids (all but one illustrated) from the southern part of Area 31.

FAO Species Identification Sheets for Area 31, 6 vols, 1978. Clupeoids by P.J.P. Whitehead. Keys, diagnoses and biological and fishery notes for 31 clupeoids of this area (all illustrated).

4. Southwestern Atlantic (Area 41)

Figueiredo, J.L. & N.A. Menezes, 1978. Manual de peixes marinhos do sudeste do Brasil, 2(1). Museu de Zoologia, Universidade de São Paulo, Brazil. Keys and descriptions of 21 clupeoids (all but one illustrated) from this region (freshwater species not included) (pp. 21 to 32).

Ringuelet, R.A., R.H. Aramburu & A.A. Arámburu, de, 1967. Los peces Argentinos de agua dulce. Comisión de Investigación Científica, Buenos Aires, 602 pp. Keys and descriptions of 7 freshwater or euryhaline clupeoids (4 illustrated) of Argentina (pp. 52-65).

Menni, R.C., R.A. Ringuelet & R.A. Arámburu, 1984. Peces marinhos de la Argentina y Uruguay. Editorial Hemisferio Sur, Buenos Aires, 395 pp. Records of 18 clupeoids (13 figures of this region) (pp. 107-110)

Bellisio, N.B., R.B. López & A. Torno, 1979. Peces marinos Patagónicos, Secretaria de Estado de Intereses Marítimos, Ministerio de Economía, Buenos Aires, 279 pp. Descriptions and biological and fishery notes for 2 clupeoids (both illustrated) of this region (pp. 53-58).

D. EASTERN ATLANTIC

1. General. No single modern work on all the clupeoids of these two areas.

2. Northeastern Atlantic and Mediterranean (Areas 27, 37)

Svetovidov, A.N., 1963 (see item A 5 above). Keys, descriptions and a great deal of biological and fishery data for 18 marine and freshwater clupeoids (all illustrated) of the northeast Atlantic and Black Sea.

Banarescu, P., 1964. Fauna Republicii Populare Romine. Pisces-Osteichthyes (pesti ganoizi si ososi), 13, Editura Academiei Republicii Populare Romine, Bucharest, 959 pp. Keys, descriptions and biological notes for 8 clupeoids (all illustrated) of the Black Sea (pp. 223-251).

Wheeler, A.C., 1978. Key to the fishes of northern Europe, Frederick Warne, London, 380 pp. Keys, descriptions, and brief notes for 6 clupeoids (all illustrated) of northern European coasts (pp. 66-71)

FAO Species Identification Sheets for Area 37, 2 vols., 1973. Clupeoids by A.N. Svetovidov. Descriptions and biological and fishery notes for 6 clupeoids (all illustrated) in this area.

CLOFNAM Checklist of the fishes of the north-eastern Atlantic and Mediterranean, 2 vols., 1973. Clupeoids mainly by A.N. Svetovidov, also P.J.P. Whitehead & A. Ben-Tuvia. Virtually complete compilation of taxonomic literature, including that for 13 clupeoids of the northeastern Atlantic and Mediterranean (pp. 99-112).

FNAM, Fishes of the north-eastern Atlantic and Mediterranean, 1st vol., 1984. Clupeoids by P.J.P. Whitehead. Keys, diagnosis and notes on biology for the 14 clupeoids (all illustrated) for the CLOFNAM area.

3. Eastern Central Atlantic (Areas 34 and 47 in part)

FAO Species Identification Sheets for Areas 34, 47 (in part), 6 vols, 1981. Clupeoids by P.J.P. Whitehead. Keys, diagnosis and biological and fishery notes for the 11 clupeoids (all illustrated) of this area.

CLOFETA, Check-list of the fishes of the eastern tropical Atlantic (in press). Clupeoids by P.J.P. Whitehead. Virtually complete compilation of taxonomic literature, including that for the 11 clupeoids of this area.

4. Southeastern Atlantic (Area 47)

All clupeoids are covered by the two works above (item D 3)

E. FRESHWATERS

1. Africa (Area 01)

CLOFFA, Checklist of the freshwater fishes of Africa, 1st vol., 1984. Clupeoids by M. Poll, G.G. Teugels & P.J.P. Whitehead. Virtually complete compilation of taxonomic literature for 39 freshwater or euryhaline clupeoids of Africa (pp. 41-56)

2. North and South America (Areas 02, 03)

No special work, but freshwater or euryhaline clupeoids included in the literature cited already.

3. Asia (Area 04)

All tropical or subtropical freshwater or euryhaline clupeoids included by Wongratana (see item A 1 above).

4. Europe (Areas 05, 07)

All freshwater or euryhaline clupeoids included by Svetovidov (see item A 5 above; see also item D 2).

5. Australia (Area 06)

No special work, but some species included by Wongratana (see item A 1 above).

1.6 Acronyms

The following six multi-authored works are more readily recognized by their titles than by their editor(s) or even their authors. To save space, however, especially in the synonymies, these works are cited by their acronyms. This seems more immediately informative, especially when there may be numerous other papers by the same author. The six works are:

CLOFETA (in press). Check-list of the fishes of the eastern tropical Atlantic, Unesco, Paris. Edited by J.-C. Quéro.

CLOFFA, vol. 1, 1984. Check-list of the freshwater fishes of Africa, Musée Royale d'Afrique Centrale, Brussels & ORSTOM, Paris. Edited by J. Daget, J.P. Gosse & D.F.E. Thys van den Audenaerde.

CLOFNAM, 1973. Check-list of the fishes of the north-eastern Atlantic and of the Mediterranean, Unesco, Paris. Edited by T. Monod & J.C. Hureau.

FNAM, vol. 1, 1984. Fishes of the north-eastern Atlantic and Mediterranean, Unesco, Paris. Edited by P.J.P. Whitehead, J.C. Hureau, J. Nielsen & M.-L. Bauchot.

FWNA, part 3, 1964. Fishes of the western North Atlantic, Sears Foundation for Marine Research, Yale University. Edited by H.B. Bigelow et al.

SFSA (in press). Sea fishes of southern Africa, Grahamstown. Edited by P. Heemstra.

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