

**DIVISION OF FISH AND GAME OF CALIFORNIA  
BUREAU OF COMMERCIAL FISHERIES  
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A Bibliography of the Sardines**



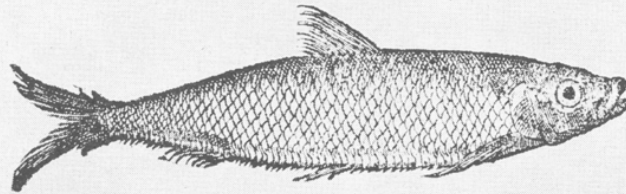
By  
*GENEVIEVE CORWIN WHEELER*

tre le iour: car par le reste du corps il est trāsparent, par cest endroit obscur. Il est de bonne chair é moienne entre molle é dure, é de bō gouft. Il fait ses oeufs le premier de ceux qui les font en l'equinoce. d'autonne se frottant le ventre contre le grauiet.

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 De la Sardine.
 

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## Chap. X.

**P**IXI'Σ ou Τριχάς, Sardine ou Sarde, entre lesquels il n'i peut auoir de difference si non que la Sarde soit la plus grande, Sardine la plus petite. C'est poisson marin du tout semblable à l'Aphye phalerique s'il n'estoit vn peu plus grand, é plus espés de bouche, d'ouies, d'yeux, de nombre é situatiō de pinnes, d'ecailles, de queue n'est different en rien d'vne petite Alofe, mais seulement de ce que l'Alofe est plus large. Dōc la Sardine ha des ecailles grandes, primies é est de diuerses couleurs: car ell'ha la teste dorée, le ventre blanc, le dos vert é bleu, ces deux couleurs reluisantes quand on la tire viue hors de la mer, le verd se perd avec la vie, le bleu demeure, encores il perd sa grande lueur. Ell'ha les boiaux petits, droits comme ceux des Alofes, elle n'ha point de fiel parquoi sans l'euentrer on la cuit sur la grille, ou en la poele, ou on la boullit: au printems elle prend gresse. Si ell'est tant soit peu gardée elle pique la langue. on sale la Sardine é se garde bien deux ans, é s'en fait de liqueur salée cōme des Anchoies, mais elle n'est pas si bonne, pour les ecailles é arestes, desquelles la chair ne se peut asses separer, é ne se peut toute fondre.

*One of the Earliest Printed Pictures of a Sardine  
(From Rondelet, Gulielmus. L'histoire entière des poissons. Lion, 1558, p. 181.)*

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## 1. INTRODUCTION

"Packed like sardines in a can" is a familiar enough expression but to few persons is it known that the sardine packing business in Cornwall, England, and Brittany, France, is the life blood of commerce and the very sustenance of the fisherfolk. Nor is it much more widely known that the California sardine furnishes by far the largest output of any single fish (494,000,000 pounds for 1930) in the huge fishing industry of this State. Some seasons in Europe the sardine comes in enormous schools and then at other times fails to put in an appearance. A French expression "la crise sardinière" (the sardine crisis) conveys the idea that a failure takes on the proportions of a disaster, and such it is to the people who depend upon it almost solely for food and employment. As would be expected much has been written to account for the erratic habits of this fish, which is so vital to the commercial life of our State as well as certain parts of Europe. So in the hope that a collection of all the theories and the facts, both scientific and commercial, might prove of assistance to those interested, this bibliography has been compiled.

The work of compiling was started by Mrs. Ruth Miller Thompson and completed by the writer after almost two years of research in eleven libraries on both the east and west coasts of the United States. Papers dealing with life history, classification, anatomy and commercial information about the sardines of the world are included. The list is as complete as possible but some papers were omitted for lack of sufficient information and doubtless others have been overlooked. The species included are *Sardina pilchardus* (Europe), *Sardina melanosticta* (Japan), *Sardina ocellata* (South Africa), *Sardina sajax* (west coast of South America), and *Sardina caerulea* (west coast of North America). Other names than these have crept in through synonymy and because it seemed wise to include fossil forms. It must be confessed that even the herring worked itself in, but this fish, once inside a tin, often masquerades as a sardine, and to the person interested in fish canning and disposal of fish waste, a sardine is a sardine no matter if it is a masquerading herring.

A question often asked is, "How do you start making a bibliography?" The writer's way was to go through all the literature in the library of the California State Fisheries Laboratory, to find everything on sardines, keeping a sharp lookout all the while for allusions to other articles. When an article was found, its contents were summarized, and later a search was made for the references contained within it. This last process necessitated translation from the French, German, Italian, Spanish, Norwegian, Danish, Slavonian, and Latin. The necessity for consultation and summarizing of papers occasioned trips to the following libraries: University of California, Stanford University, California Academy of Sciences, Harvard Museum of Comparative Zoology, American Museum of Natural History, Surgeon General's Library, United States Bureau of Fisheries, Library of Congress, Smithsonian Institution, and United States National Museum. It might seem needless to go to all the labor of consulting every paper, but it has been the painful experience of the writer that everyone makes errors in

copying citations, and only with the utmost care in verification and rechecking can reasonable accuracy be attained. Even a collection of accurate titles, with no guide to their contents, is of small value to the researcher compared to an annotated list. A few words to explain the contents may save him much time, both in eliminating the useless and in finding the valuable papers. These summaries, given again in the form of an index, are offered as further assistance to the investigator.

Consistency in such detailed work is almost the despair of the compiler, for with the utmost care inconsistencies appear as by evil magic. Accuracy, however, is the most valued attribute but at times it has a most annoying propensity for clashing with consistency. Titles of periodicals have an exasperating way of changing, spellings and names of species and genera vary, so at times the confusion seems hopeless. However, the plan followed was to smooth out the inconsistencies of names and spelling in the subject index according to the best judgment possible but in the résumé appended to each title, to have the name and spelling just as the author wrote it. In all but a few titles the date of printing has been determined, but in a few cases it could not be ascertained. In some instances the date in the margin is not the date quoted in the title, for instance:

**Radcliffe, Lewis.** 1923. Fisheries industries of the United States. U. S. Comm. Fish., Rept. [for 1922].

The marginal date is always the date of printing and for the sake of completeness the other date is included to indicate the period covered by the contents. The brackets are for clarity.

Since the importance of a paper or article lies principally in the opinion of the individual reader, it was thought best not to indicate this point but rather to allow the searcher to form his own idea from the number of pages of the article, the résumé, or the author's standing in the subject treated. The system of listing the authors alphabetically and the papers of each author chronologically is the same as followed in "A Bibliography of the Tunas."<sup>1</sup> Likewise, a list is included of the periodicals cited with the abbreviations used, this being done in the hope of saving the time and temper of the investigator, who too often is delayed by exasperating search occasioned by incomplete or misleading citations.

It is the pleasure of the writer to acknowledge the friendly cooperation of all the librarians to whom appeal was made, and especially to the following: Miss Eleanor K. Sweet, Museum of Comparative Zoology, Harvard College; Miss Louise Beitzell, United States Bureau of Fisheries; Mr. J. V. Butt, Smithsonian Division of the Library of Congress; Miss Margaret Titcomb, American Museum of Natural History; and Dr. E. W. Gudger, who as Bibliographer at the American Museum of Natural History, offered not only encouragement but valuable suggestions. Grateful thanks are due members of the staff of the California State Fisheries Laboratory, especially Miss Kathryn Karmelich who typed the manuscript and rendered valuable assistance in preparing the bulletin for printing.

May, 1931.

<sup>1</sup> Corwin, Genevieve. 1930. A bibliography of the tunas. Calif. Div. Fish Game, Fish Bull., no. 22, 103 pp.

## 2. AUTHORS' LIST OF TITLES

NOTE.—The date directly beneath the author's name is the date of printing. Dates inserted elsewhere and inclosed in brackets indicate the period for which the volume was issued. The pages given are for sardine information only (not the entire contents of the article or book). A dagger (†) indicates papers not seen by the compiler but thought important enough to include. Titles of serials are given exactly as for the year quoted regardless of subsequent changes. The résumés contain exact names and spelling used by the author quoted and therefore exhibit many inconsistencies. Numbers in bold-face type (such as 10) indicate volume number.

### 2.1. A

**Abbott, James Francis.** 1900. The marine fishes of Peru. Acad. Nat. Sci. Philadelphia, Proc. [for 1899] p. 334.

*Clupanodon sajax*: synonymy.

**Acloque, A.** 1900. Faune de France contenant la description des espèces indigènes disposées en tableaux analytiques . . . Paris, p. 460.

*Alosa sardina*: described; figured.

**Addinsell, A. W.** 1884. On a case of poisoning by sardines. *Lancet*, London, **2**, p. 540.

**Aflalo, Frederick George.** 1901. The herring and its kindred. In Cornish, C. J., *The living animals of the world*. London, 1901–1902, 2 vols., p. 659, 661, 1 fig.

*Pilchard* described; figure of Australian pilchard; range on British coast.

1904.1. The sea-fishing industry of England and Wales. A popular account of the sea fisheries and fishing ports of those countries. London, p. 9, 10, 17–18, 66–68, 86, 289, 334–335.

*Pilchard*: fluctuations in abundance on French and English coasts; fishing methods and gear; exports and imports; alternation of abundance of herring and pilchards; methods of preservation; old fishing regulations (time of Queen Elizabeth); statistics of Cornwall fishery.

1904.2. British salt-water fishes with a chapter on the artificial culture of sea fishes by R. B. Marston. London, p. 54, 201, 205–206.

*Clupea pilchardus*: habits; fishing methods and gear; spawning; description of egg.

**Alaejos Sanz, Luis.** 1923. Provincia de Santander. In *La pesca marítima en España en 1920*. Madrid, 2, p. 166–168, 186. Also in *Bol. Pesca*, 1922, 7, no. 65–67, p. 42–44, 62.

*Clupea pilchardus*: fishery; statistics.

**Albert I, Honoré Charles (Prince de Monaco)** 1887. Le pêche de la sardine sur les côtes d'Espagne. *Revue Sci.*, 3. sér., **13**, p. 513–519. Also *separate*, *L'industrie de la sardine sur les côtes de la Galice*. Paris, 1887.

Migrations; food; methods of fishing and gear; salting and canning methods; laws regulating fishery.

**Aldrovandi, Ulyssis.** 1638. De piscibus libri V. Bononiae, p. 219–220.

*Sardina*: description.

**Allary, J.** 1913. Les bateaux de pêche à moteur à Arcachon. *Le Yacht*, no. 1765, Jan. 6. *Extract in Bull. Trim. Pêch. Marit.*, **18**, no. 2, p. 244–251, 6 figs.

Construction of motor boats used in French sardine fishery.

**Allen, E. J.** 1920. Report on investigations at the western end of the English Channel. *Cons. Explor. Mer, Publ. Circ.*, no. 72, p. 8–9.

Bibliography of recent work on European sardine.

1922. Programme of work on mackerel and pilchard submitted to the fish section of the International Council for the Study of the Sea. *Cons. Explor. Mer, P. V.*, **28**, p. 36–38. [Text in English and French.]  
Scientific investigations.
- Allen, Winfred Emory.** 1920. Behavior of loon and sardines. *Ecology*, **1**, p. 309–310.  
Sardinella caeruleus: behavior.
1930. Elusive sardines. *Catalina Islander*, **17**, no. 4, Jan. 29, p. 10.  
Behavior of school of sardines when pursued by loon.
- American Fish Culturist.** 1904. Sardines. *American Fish Culturist*, **1**, no. 3, p. 15.  
Short article on European methods of canning.
- Amieux, Louis.** 1909. L'industrie sardinière et ses nécessités. *Cong. Pêch. Marit., Sables-d'Olonne, C. R.*, **2**, p. 28–33. *Also in Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, 1912, 1. fasc.*, p. 82–86.  
Suggestions for improving French sardine industry.
1912. Documents concernant la crise sardinière. 1903 à 1912. Réunis par M. Louis Amieux. Nantes, 1. fasc., 185 pp.  
Collected documents relating to the sardine failure in 1912; "filets tournants," a kind of net, described; reports and information concerning the sardine question.
1929. Les tendances actuelles de l'industrie des conserves de poissons sur les côtes de Bretagne et de Vendée. *Pêch. Marit.*, **12**, extra number for Sept. 8, p. 79–81.  
Present day tendencies in the French sardine canning industry.
- Andrews, Carroll B.** 1928. Seasonal average length trends at Monterey of the California sardine (*Sardina caerulea*). *Calif. Div. Fish Game, Fish Bull.*, no. 13, 13 pp. *Reviewed in Cons. Explor. Mer, Journ.*, 1929, **4**, no. 1, p. 118–119; no. 2, p. 226–229.  
Description of statistical methods; tables; graphs.
- Anthony, R.** 1909. La croisière du "René" entreprise pour contribuer à l'étude biologique de la sardine. *Cong. Pêch. Marit., Sables-d'Olonne, C. R.*, **2**, p. 43–49.  
Outline of plan for investigation of causes of sardine migrations.
- Antipa, Gregor.** 1904. Die Clupeinen des westlichen Teiles des Schwarzen Meeres und der Donaumündungen. *Akad. Wiss. Wien, Anz.*, **41**, p. 302.  
*Sardina dobrogica* from Black Sea described.
1906. Die Clupeinen des westlichen Teiles des Schwarzen Meeres und der Donaumündungen. *Akad. Wiss. Wien, Denkschr.* [for 1905] **78**, p. 39–44, 7 figs.  
*Clupea dobrogica* (Black Sea sardine): description; figured; comparison with *Sardina pilchardus* in form and measurements; methods of fishing in Black Sea.
- Apicius, Coelius.** 1705. *Apicii Coelii de opsoniis et condimentis, sive arte coquinaria, libri X. Londini, lib. 9, ch. 10, p. 213.*  
Recipe for preparing sardines as food.
- Apostolidès, Nicholas Chr.** 1883. La pêche en Grèce, Athènes, p. 31, 36, 45.  
*Meletta phalerica*: fishing seasons; fishing methods and gear.



- Argentier, Nicholas Chr.** 1919. Étude d'ensemble sur les pêches de la sardine, du thon et des crustacés en Méditerranée. 6. Cong. Nat. Pêch. Marit., Tunis, **2**, p. 72–104.  
A summary of questionnaires sent to Corsica, Algeria and five maritime districts of France to find out fishing methods and gear, size and location of factories, fluctuations of fishery, value and disposal of product, methods of preservation.
- Arné, Paul.** 1927. Rapport sur les sardines de la région de Saint-Jean-de-Luz. France off. Sci. Pêch. Marit., Notes, no. 52, p. 58–75. *Reviewed in* Pêch. Marit., 1927, **10**, no. 492, p. 692.  
Statistics of French fishery; temperature; density; spawning season; sexual maturity; eggs and larvae; size at different ages (age determined by scale readings).
- 1928.1. Note sur les sardines de la région de Saint-Jean-de-Luz. Soc. Océanogr. France, Bull., **8**, no. 42, p. 794–798.  
Age and size; scale structure; two figures of scales showing growth rings; spawning.
- 1928.2. La pêche de la sardine dans la région de Saint-Jean-de-Luz en 1927. France off. Sci. Pêch. Marit., Revue Trav., **1**, fasc. 1, p. 54–73.  
Conditions of fishery; temperature and density of water; state of sexual maturity at different times of year; size and age; growth as recorded on scales; figures of six scales.
1929. La pêche de la sardine dans la région de Saint-Jean-de-Luz en 1928. France off. Sci. Pêch. Marit., Revue Trav., **2**, no. 2, p. 137–151. *Reviewed in* Pêch. Marit., 1929, **12**, no. 595, p. 659.  
Statistics of the fishery for 1927 and 1928; races; spawning period; growth; morphological characters (number of vertebrae, length, position of dorsal fin).
- Artedi, Peter.** 1788. Bibliotheca ichthyologia . . . emendata et aucta a Iohanne Iulio Walbaum. Grypeswaldiae, 1788–1792.  
*See* Walbaum, J. J., editor.
- Arthur, W.** 1883. Notes on the picton herring, *Clupea pilchardus* (*C. sajax*, New Zealand form). New Zealand Inst., Trans., **15**, p. 208–213, 1 pl.  
Description of four specimens of *Clupea sajax*, including stomach contents; spawning season; distribution.
- Athanassopoulos, G.** 1925. Notes sur la pêche en Grèce. Inst. Océanogr. Monaco, Bull., no. 454, p. 6–7.  
Use of "terre rouge" in salting sardines; chemical composition of substance.
- Atco Fisheries News.** 1925. Pilchard oil industry. Atco Fish. News, Oct., p. 6.  
Oil industry on Vancouver Island.
- Auché, A.** 1894. Sur le cocco-bacille rouge de la sardine. Soc. Biol. Paris, C. R., 10. sér., **1**, p. 18–21.  
Bacteriology of canned sardines.
- Auffret, A.** 1930. Résultats de la pêche en Algérie pendant le 2<sup>e</sup> semestre de l'année 1929. Sta. Aqu. Pêch. Castiglione, Bull. [for 1929] p. 202.  
Sardine statistics.
- Autran, H.** 1912. Rapport . . . à M. le directeur de l'office national du commerce extérieur, Paris. Objet: Conserves de sardines à l'huile françaises. Concurrence norvégienne. *In* Documents concernant la crise sardinière. 1903 à 1912. Réunis par Louis Amieux. Nantes, **1**, fasc., p.

Canning of sardine; controversy with Norway over labeling other kinds of fish as sardines.

**Avard, C. C.** 1918. The canning of sardines at Black's Harbor. *Canadian Fish.*, **5**, p. 1002–1014.

Methods of fishing and canning (small herring), east coast of Canada.

**Ayson, L. F.** 1924. New Zealand fish and fisheries. Wellington, p. 7.

*Sardinia neopilchardus* listed among the most important market fish.

## 2.2. B

**Barclay, M.** 1910. Paa Sardiniske fra Concarneau, forsog med Kveiterogn som Sardinagn. *Norsk. FiskTid.*, **29**, heft 6, p. 203–215, 12 figs.

Methods of sardine fishing at Concarneau; methods of preservation.

**Barnard, K. H.** 1925. A monograph of the marine fishes of South Africa. *S. African Mus., Ann.*, **21**, pt. 1, p. 112.

*Sardina sajax*: description; distribution; eggs and larvae described.

**Barron, Jonathan.** 1897+. Cornwall sea fisheries district local fisheries committee. Report of fishery officer. Mevagissy. Quarterly report (current).

Condition of sardine fishery.

**Bateson, William.** 1890. Pilchards (*Clupea pilchardus*) with the number of scales abnormally increased. *Zool. Soc. London, Proc.*, p. 586–588.

Description and discussion of specimens showing abnormal number of scales.

1894. [On specimens of the common pilchard, *Clupea pilchardus*, showing variation in the number and size of the scales.] *Zool. Soc. London, Proc.*, p. 164.

Discussion of size and number of scales of six specimens of pilchard taken in Cornwall.

**Baudouin, Marcel.** 1888. L'industrie de la sardine en Vendée. *Revue Sci.*, **41**, 3. sér., **15**, p. 651–660, 689–692. *Also separate*, 1894.

Sardine fishing methods and gear in Vendée, France; methods of preservation including canning; discussion of causes of failure of fishery.

1893.1. La pêche de la sardine en Vendée. La pêche sablaise au commencement du siècle. *Revue Sci. Nat. Ouest*, **3**, p. 278–281.

History of sardine fishery of Vendée at beginning of 19th century.

1893.2. L'industrie de la sardine en Vendée. *Revue Sci. Nat. Ouest*, **3**, p. 289–336. (This paper, an elaboration of Baudouin, 1888, much enlarged; illustrated.)

Fishing areas; habitat; migrations; influence of winds on presence of sardines; history of fishery on coast of Vendée; description of methods and gear; history of canning factories; methods used in canning; statistics of fishery; causes of decline in fishery for ten preceding years.

1904. Le Lernæenicus sprattæ parasite de la sardine en Vendée. *Acad. Sci. Paris, C. R.*, **139**, p. 998–1000. *Also separate*, Paris, 1904, 4 pp., 1 fig.

Copepod parasite of sardine.

1905.1. Nouvelles observations sur le Lernæenicus, copépode parasite de la sardine. *Mus. Hist. Nat. Paris, Bull.*, **10**, p. 299–300.

Copepod parasite.

- 1905.2. Mode de fixation dorsale du *Lernæenicus sardinae* sur son hôte. Acad. Sci. Paris, C. R., **140**, no. 5, p. 326–327.  
Copepod parasite.
- 1905.3. Les parasites de la sardine. Revue Sci., **3**, p. 715–722, 6 figs.  
Discussion of all the known parasites of sardines: isopods, copepods, coccidia, trematodes, nematodes; special study of *Lernæenicus sardinae*, with description and six figures.
1907. Du mode d'attaque de la sardine (*Clupea pilchardus* W.) par un copépode parasite (*Lernæenicus sardinae* M. B.) in Vendée. Soc. Sci. Nat. Ouest France, Bull., **7**, 2. sem., fasc. 3–4, p. 97–114, 6 figs. *Also separate*, Nantes, 1908, 20 pp., 6 figs.  
Anatomy and mode of attachment of this copepod parasite.
1908. Mode d'attaque du spratt (*Clupea spratta*) par le *Lernæenicus sprattae*, copépode parasite de l'oeil du poisson. Assoc. Franç. Avanc. Sci., C. R. [for 1907] **36**. sess., pt. 1, p. 259; pt. 2, p. 727–741.  
Copepod parasite of sardine eye.
1909. Nouvelles observations statistiques sur le parasite principal *Lernæenicus sardinae* (M. Baudouin). Cong. Pêch. Marit., Sables-d'Olonne, C. R., **1**, p. 120–138.  
Copepod parasite of sardine.
1910. Mode de fixation du *Lernæenicus sardinae* M. B. sur l'oeil de la sardine (*Clupea pilchardus* Wal.). Assoc. Franç. Avanc. Sci., C. R. [for 1909] **38**, p. 658–662.  
Copepod parasite of sardine; morphology; mode of fixation.
- 1911.1. Un cas de parasitisme exceptionnel chez la sardine (*Lernæenicus sprattae*). Soc. Sci. Nat. Ouest France, Bull., 3. sér., **1**, p. iii–iv.  
Copepod parasite on eye of sardine.
- 1911.2. Découverte d'un type de transition entre *Lernæenicus sardinae* M. Baudouin et *L. sprattae* Sowerby, sur la même sardine (*Clupea pilchardus* Wal.); *L. sardinae*, variété moniliformis. Assoc. Franç. Avanc. Sci., C. R. [for 1910] **39**, p. 163–167.  
Description of two species of copepod parasites on the same sardine.
1914. Deux exemples d'atavisme chez le copépode parasite du spratt et de la sardine (*Lernæenicus sprattae* Sow.). Assoc. Franç. Avanc. Sci., C. R. [for 1913] **42**, p. 369–370. *Also separate*, Paris, 1914.  
Copepod parasite.
1918. Découverte d'une variété de *Lernæenicus sardinae* M. B. entre le type et la variété moniliformis. Mus. Hist. Nat. Paris, Bull., no. 6, p. 394–396.  
A new variety of copepod, parasitic on the eye of sardine.
- Bauer**, V. 1921. La pesca marittima in Turchia. Italy Com. Talasso., Boll. Bimes., no. 66–68, (**9**, fasc. 4–6), p. 112, 115.  
*Clupea pilchardus* listed with Turkish common names; statistics.
- Bean**, *Tarleton Hoffman*. 1880. A list of European fishes in the collection of the United States National Museum. U. S. Nat. Mus., Proc. [for 1879] **2**, p. 37.  
*Clupea sardina* listed.
1903. Catalogue of the fishes of New York. New York State Mus., Bull., no. 60, zool. 9, p. 209.  
*Sardinella* sp., one specimen of nine inches recorded from Gravesend Bay in 1895.
- Bean**, *Tarleton Hoffman*, and **Dresel**, H. G. 1885. A catalogue of fishes received from the public museum of the Institute of Jamaica, with descriptions of . . . two new species. U. S. Nat. Mus., Proc. [for 1884] **7**, p. 169.  
*Clupea pseudohispanica* recorded from Jamaica.

- Beard, Harry Randall.** 1921. California sardine food products and their preparation. *Calif. Fish Game*, **7**, no. 4, p. 238–247. *Also in* U. S. B. F., Mem. Ser., no. 274, 6 pp.  
Methods of canning in California; food value equal to all other meats.
1922. Changes in oil used for frying sardines. *Calif. Fish Game Comm., Circ.*, no. 1, 8 pp. *Also in* *Fish Gaz.*, 1922, **39**, no. 11, p. 32–34, 63; *and* U. S. B. F., Mem. Ser., 1923, no. 243, 3 pp.  
Experiments in canning California sardines.
1923. Some considerations concerning the canning of sardines. *American Fish. Soc., Trans.*, **53**, p. 122–130.  
Canning.
1924. Drying of fish for canning as sardines. *Pacific Fish.*, **22**, no. 10, p. 9–10.  
Canning processes.
1925. New method of preparing sardines. *Pacific Fish.*, **23**, no. 3, p. 12–14.  
Canning methods—clear, detailed discussion with diagram of apparatus.
1928. Preparation of fish for canning as sardines. U. S. B. F., Rept. [for 1927] (Doc. 1020); Technological Contribution no. 34.  
Detailed description of different methods and apparatus for canning sardines employed throughout the world.
- Bellet, Daniel.** 1913. Les sardiniers et les lois économiques. *Journ. Écon.*, **72**, Feb., p. 241–247.  
Discussion of sardine failure from economic point of view.
- Belloc, Georges.** 1927. Rapport sur les croisières aériennes. *France off. Sci. Pêch. Marit., Notes*, no. 52, p. 52–55.  
Description and map of trips made by dirigible to find sardine schools off the southwest coast of France.
1930. La question de la sardine dite "sauvage." *France off. Sci. Pêch. Marit., Revue Trav.*, **3**, fasc. 1, p. 47–62.  
New out-of-season fishery discovered in 1925 off Sables-d'Olonne of inferior quality fish; investigation on size; proportion of sexes; body proportions; number of vertebrae; growth; females larger at same age; sexual maturity; intestinal fat; temperature of water; salinity; food; summary of characters distinguishing this group of sardines; differences shown after cooking for canning; four figures showing adult fish.
- Belloc, Georges, and Desbrosses, P.** 1930. Remarques sur la sexualité de la sardine *Clupea pilchardus* Walb. *France off. Sci. Pêch. Marit., Revue Trav.*, **3**, fasc. 1, p. 63–77.  
Description and diagrams of mature gonads; varying results in investigations on relation between size and sex; proportion of males and females; growth; sexual maturity; morphological characters (measurements of different parts of body showing sexual dimorphism).
- Belon, Picrre.** 1553. *De aquatilibus, libri duo. Cum eiconibus ad vivam ipsorum effigiem, quoad eius fieri potuit, expressis.* Parisiis, p. 170–172.  
Description of sardine.
- Bénard, Charles.** 1903. *La question sardinière.* Bordeaux, p. 3–16.  
Life history of European sardine as far as known; migrations; food; suggestions for scientific study of sardine question; criticism of nets and bait; comparison with Spanish and Portuguese methods and gear; recommendations to help situation.
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Growth of this industry; use of surplus fish for fertilizer.

1917.3. Success in the turn of a can. *Pacific Fish.*, **15**, no. 6, p. 26.

Beginning of use of tall round tin for sardines. (*See* Wheeler, H. E., 1917.)

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1919.4. Present status of sardine inspection service. *Pacific Fish.*, **17**, no. 5, p. 75.  
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Statistics of California.

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## 2.24. Y

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## 2.25. Z

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*Clupea sajax*: distribution.



### 3. LIST OF ABBREVIATIONS USED FOR PERIODICALS CITED

#### A

<b>Aarsb. Norges Fisk.</b> —Aarsberetning Vedkommende Norges Fiskerier. Bergen.	.
<b>Acad. Nat. Sci. Philadelphia.</b> —Academy of Natural Sciences of Philadelphia.	.
<b>Proc.</b> —Proceedings.	—
<b>Acad. Roumaine.</b> —Académie Roumaine. Bucharest.	.
<b>Bull. Sec. Sci.</b> —Bulletin de la Section Scientifique.	—
<b>Acad. Sci. Lisboa.</b> —Academia Real das Sciencias de Lisboa. Lisboa.	.
<b>Jorn.</b> —Jornal das Sciencias Mathematicas, Physicas, e Naturaes.	—
<b>Acad. Sci. Paris.</b> —Académie des Sciences. Paris.	.
<b>C. R.</b> —Compte Rendu.	—
<b>Mém.</b> —Mémoires.	—
<b>Akad. Wiss. Wien.</b> —Kaiserlichen Akademie der Wissenschaften Wien. Mathematisch-naturwissenschaftliche Klasse.	.
<b>Anz.</b> —Anzeiger.	—
<b>Denkschr.</b> —Denkschriften.	—
<b>Sitzber.</b> —Sitzungsberichte.	—
<b>American Fish Culturist.</b> —St. Johnsbury, Vermont.	.
<b>American Fish Soc.</b> —American Fisheries Society.	.
<b>Trans.</b> —Transactions.	—
<b>American Journ. Pub. Health.</b> —American Journal of Public Health. American Public Health Association. Boston.	.
<b>American Nat.</b> —American Naturalist. Boston.	.
<b>Ann. Fals.</b> —Annales des Falsifications. Paris.	.
<b>Ann. Mag. Nat. Hist.</b> —Annals and Magazine of Natural History. London.	.
<b>Ann. Micrographie.</b> —Annales de Micrographie. Paris.	.
<b>Ann. Sci. Nat.</b> —Annales des Sciences Naturelles. Paris.	.
<b>Zool.</b> —Zoologie.	—
<b>Ann. Sci. Nat. Oporto.</b> —Annaes de Sciencias Naturaes. Oporto.	.
<b>Arch. Méd. Navale.</b> —Archives de Médecine Navale et Coloniale. France. Ministère de la Marine. Paris.	.
<b>Arch. Pharm.</b> —Archives de Pharmacie. Paris.	.
<b>Arch. Sci. Phys. Nat.</b> —Archives des Sciences Physiques et Naturelles. Genève.	.
<b>Arch. Zool. Exp.</b> —Archives de Zoologie Expérimentale et Générale. Paris.	.
<b>Assoc. Bretonne.</b> —Association Bretonne. Saint-Brieuc.	.
<b>Bull. Archéol.</b> —Bulletin Archéologie.	—
<b>Assoc. Franç. Avanc. Sci.</b> —Association Française pour l'Avancement des Sciences. Paris.	.
<b>Bull.</b> —Bulletin.	—
<b>C. R.</b> —Compte Rendu de la Session.	—
<b>Atco Fish. News.</b> —Atco Fisheries News. New York.	.
<b>Australian Mus.</b> —Australian Museum. Sydney.	.
<b>Mem.</b> —Memoirs.	—
<b>Rec.</b> —Records.	—

#### B

<b>Batav. Genoot. Kunst. Wetens.</b> —Bataviaasch Genootschap van Kunsten en Wetenschappen. Batavia.	.
<b>Verh.</b> —Verhandelingen.	—
<b>Beitr. Paläont. Oesterreich-Ungarn.</b> —Beiträge zur Paläontologie und Geologie Oesterreich-Ungarn's und des Orients. Wien.	.
<b>Berwickshire Nat. Club.</b> —Berwickshire Naturalists Club. Alnwick.	.
<b>Proc.</b> —Proceedings and History.	—
<b>Biol. Abst.</b> —Biological Abstracts. Philadelphia.	.
<b>Bingham Oceanogr. Coll.</b> —Bingham Oceanographical Collection. New Haven, Connecticut.	.
<b>Bull.</b> —Bulletin.	—
<b>Bishop Mus.</b> —Bernice Pauahi Bishop Museum of Polynesian Ethnology and Natural History. Honolulu.	.
<b>Mem.</b> —Memoirs.	—

## C

- Bol. Pescas.**—*See* Spain Inst. Español Oceanogr. .  
**Boletin Bosques, Pesca i Caza.**—Santiago. .  
**Boll. Pesca Piscicult. Idrobiol.**—Bollettino di Pesca, Piscicoltura e di Idrobiologia. Italy. Ministero dell'Economia Nazionale. Roma. .  
**Boston Soc. Nat. Hist.**—Boston Society of Natural History. .  
**Occ. Pap.**—Occasional Papers. —  
**Brit. Assoc. Adv. Sci.**—British Association for the Advancement of Science. London. .  
**Rept.**—Report. —  
**Brit. Med. Journ.**—British Medical Journal. London. .  
**Bull. Mar. March.**—Bulletin Générale de la Marine Marchande. Paris. .  
**Bull. Trim. Pêch. Marit.**—Bulletin Trimestriel de l'Enseignement Professionnel et Technique des Pêches Maritimes. Paris. .
- Calif. Acad. Sci.**—California Academy of Sciences. San Francisco. .  
**Proc.**—Proceedings. —  
**Calif. Comm. Fish.**—California Commissioners of Fisheries. Sacramento. .  
**Rept.**—Report. —  
**Calif. Div. Fish Game.**—California Division of Fish and Game. Sacramento. .  
**Bienn. Rept.**—Biennial Report. —  
**Calif. Fish Game.**—California Fish and Game. —  
**Circ.**—Circular. —  
**Fish Bull.**—Fish Bulletin. —  
**Calif. Fish.**—California Fisheries. San Pedro, California. *Continued as* West Coast Fisheries. .  
**Calif. Fish Game.**—*See* Calif. Div. Fish Game. .  
**Calif. Fish Game Comm.**—California Fish and Game Commission. Sacramento. *See* Calif. Div. Fish Game, to which title was changed in 1927. .  
**Canada Dept. Mar. Fish.**—Canada. Department of Marine and Fisheries. Ottawa. .  
**Ann. Rept.**—Annual Report. —  
**Canada Dom. Bur. Stat.**—Canada. Dominion Bureau of Statistics. Ottawa. .  
**Canada Fish. Branch.**—Canada. Department of the Naval Service, Fisheries Branch. Ottawa. .  
**Contrib. Canadian Biol.**—Contributions to Canadian Biology. —  
**Rept.**—Report. —  
**Canadian Chem. Met.**—Canadian Chemistry and Metallurgy. Canadian Institute of Chemistry. Toronto. .  
**Canadian Fish.**—Canadian Fisherman. Montreal. .  
**Canterbury Mus.**—Conterbury Museum. Christchurch, New Zealand. .  
**Rec.**—Records. —  
**Carnegie Mus.**—Carnegie Museum. Pittsburg. .  
**Ann.**—Annals. —  
**Mem.**—Memoirs. —  
**Catalina Islander.**—Avalon, California. .  
**Ceylon Mar. Biol.**—Ceylon. Marine Biologist. Colombo. .  
**Admin. Rept.**—Administration Report. —  
**Chem.-Zeit.**—Chemiker-Zeitung. Cöthen. .  
**Cong. Intern. Aq. Pêch.**—Congrès International d'Aquiculture et de Pêche. Paris. .  
**Mém.**—Mémoires et Compte-Rendus. —  
**Cong. Intern. Pêch. Marit. Sables-d'Olonne.**—Congrès International des Pêches Maritimes; d'Ostréiculture, et d'Aquiculture Marine. Sables-d'Olonne. .  
**Cong. Nat. Pêch. Marit.**—Congrès National des Pêches Maritimes. Tunis. Bordeaux. .  
**C. R.**—Mémoires et Comptes Rendus des Séances. —  
**Cong. Pêch. Marit. Sables-d'Olonne.**—Congrès des Pêches Maritimes des Sables-d'Olonne. .  
**C. R.**—Comptes Rendus. —  
**Cons. Explor. Mer.**—Conseil Permanent International pour l'Exploration de la Mer. Copenhague. .  
**Journ.**—Journal du Conseil. —

	P. V.—Rapports et Procès-Verbaux.	—
	Publ. Circ.—Publications de Circonstance.	—
	Copeia.—New York.	·
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	Danish Oceanogr. Exped.—Danish Oceanographical Expeditions, 1908–1910, to the Mediterranean and Adjacent Seas. Copenhagen.	·
	Rept.—Report.	—
	Dove Mar. Lab.—Dove Marine Laboratory. Northumberland Sea Fisheries' Committee. Cullercoats.	·
	Rept.—Report.	—
<b>E</b>		
	Ecology.—Lancaster, Pennsylvania.	·
	England Insp. Fish.—England. Inspectors of Fisheries. London.	·
	Ann. Rept.—Annual Report.	—
	England Min. Ag. Fish.—England. Ministry of Agriculture and Fisheries. London.	·
	Fish. Invest.—Fisheries Investigations.	—
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	Field Mus. Nat. Hist.—Field Museum of Natural History. Chicago.	·
	Publ. Zool. Ser.—Publications. Zoological Series.	—
	Fischerbote.—Der Fischerbote. Hamburg.	·
	Fischwirtschaft.—Die Fischwirtschaft. Wesermünde.	·
	Fish. Gaz.—Fishing Gazette. New York.	·
	Fish. News.—Fishing News. Aberdeen, Scotland.	·
	Fisk. Gang.—Fiskets Gang. Bergen.	·
	Food Indus.—Food Industries. New York.	·
	France Chamb. Dép.—France. Chambre des Députés. Paris.	·
	France Comm. Études.—France. Commission d'Études. Paris.	·
	France Min. Instruct. Publ.—France. Ministère de l'Instruction Publique. Paris.	·
	Arch. Nat.—Archives Nationales.	—
	France Min. Mar.—France. Ministère de la Marine. Paris.	·
	France Min. Trav. Pub.—France. Ministère de Travaux Publics. Paris.	·
	France off. Sci. Pêch. Marit.—France. office Scientifique et Technique des Pêches Maritimes. Paris.	·
	Mém. (Sér. Spéc.)—Mémoires. (Série Spéciale.)	—
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	Notes.—Notes et Rapports. <i>Continued as</i>	—
	Revue Trav.—Revue des Travaux.	—
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	Himmel und Erde.—Gesellschaft Urania. Leipzig; Berlin.	·
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	Indus. Eng. Chem.—Industrial and Engineering Chemistry. American Chemical Society. Washington.	·
	Indus. Franç. Cons.—L'Industrie Française de la Conserve. Paris.	·
	Inst. Catalana Hist. Nat.—Institut Catalana d'Historia Natural. Barcelona.	·
	Butl.—Butlletí.	—
	Inst. Gen. Tec. Valencia.—Instituto General y Tecnico de Valencia.	·
	An.—Annales.	—
	Inst. Océanogr. Monaco.—L'Institut Océanographique de Monaco. Monaco.	·
	Ann.—Annales.	—
	Bull.—Bulletin.	—

- Inst. Pasteur.**—Institut Pasteur. Paris. .  
**Ann.**—Annales. —  
**Intern. Fish. Exhib. Lit.**—International Fisheries Exhibition Literature. London. .  
**Ireland Insp. Fish.**—Ireland. Inspector of Irish Fisheries. Dublin. .  
**Rept.**—Report. —  
**Italy Com. Talasso.**—Italy. Comitato Talassografico Italiano. Venezia. .  
**Boll. Bimes.**—Bollettino Bimestrale. —  
**Mem.**—Memoria. —
- J**
- Japan Imp. Fish. Bur.**—Japan. Imperial Fisheries Bureau. Tokyo. .  
**Journ.**—Journal. —  
**Japan Imp. Fish. Inst.**—Japan. Imperial Fisheries Institute. Tokyo. .  
**Journ.**—Journal. —  
**Journ. Anat. Physiol. London.**—Journal of Anatomy and Physiology. Anatomical Society of Great Britain and Ireland. London. .  
**Journ. Anat. Physiol. Paris.**—Journal de l'Anatomie et de la Physiologie Normales et Pathologiques de l'Homme et des Animaux. Paris. .  
**Journ. Biol. Chem.**—Journal of Biological Chemistry. New York. .  
**Journ. Econ.**—Journal des Economistes. Paris. .  
**Journ. Hyg.**—Journal of Hygiene. Cambridge, England. .  
**Journ. Infect. Dis.**—Journal of Infectious Diseases. Memorial Institute for Infectious Diseases. Chicago. .  
**Journ. Méd. Bordeaux.**—Journal de Médecine de Bordeaux. Bordeaux. .  
**Journ. Méd. Chir. Prat.**—Journal de Médecine et de Chirurgie Pratiques. Paris. .  
**Journ. off.**—Journal officiel de la République Française. Paris. .  
**Journ. Pharm.**—Journal de Pharmacie et de Chimie. Société de Pharmacie de Paris. Paris. .  
**Jugoslav. Akad.**—Jugoslavenska Akademija Znanosti i Umjetnosti. Zagrab. .  
**Rad.** —
- L**
- Lab. Zool. Concarneau.**—Laboratoire de Zoologie et de Physiologie Maritimes de Concarneau. Concarneau. .  
**Trav. Sci.**—Travaux Scientifiques. —  
**Laguna Mar. Lab.**—Laguna Marine Laboratory. Pomona College. Claremont, California. .  
**Ann. Rept.**—Annual Report. —  
**Lancashire Sea-fish. Lab.**—Lancashire Sea-fisheries Laboratory. Liverpool University. Liverpool. .  
**Rept.**—Report. —  
**Linnean Soc. London.**—Linnean Society of London. .  
**Journ. Zool.**—Journal. Zoology. —  
**Linnean Soc. New S. Wales.**—Linnean Society of New South Wales. Sydney. .  
**Proc.**—Proceedings. —  
**Liverpool Biol. Soc.**—Liverpool Biological Society. Liverpool. .  
**Trans.**—Proceedings and Transactions. (Includes Report on the Lancashire Sea-fisheries Laboratory at University of Liverpool and Annual Report of Liverpool Marine Biology Committee.) .
- M**
- Madras Fish. Bull.**—Madras Fisheries Department. Madras. .  
**Bull.**—Bulletin. —  
**Mar. Biol. Assoc.**—Marine Biological Association of the United Kingdom. Plymouth. .  
**Intern. Fish. Invest.**—International Fisheries Investigations. London. .  
**Journ.**—Journal. —  
**Mechanics Mag.**—Mechanics Magazine. London. .  
**Med. Vissch.**—Mededeelingen over Visscherij. Helder. .  
**Miss. Italiana Esplor. Levante.**—Missione Italiana per l'Esplorazione dei Mari di Levante. Venezia. .  
**Mus. Hist. Nat. Marseille.**—Musée d'Histoire Naturelle de Marseille. Marseille. .  
**Ann. Zool.**—Annales. Zoologie. —

	<b>Mus. Hist. Nat. Paris.</b> —Muséum d'Histoire Naturelle de Paris. Paris.	.
	<b>Bull.</b> —Bulletin.	—
	<b>Mus. Nac. Cien. Nat.</b> —Museo Nacional de Ciencias Naturales. Madrid.	.
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	<b>Nat. Geogr. Mag.</b> —National Geographic Magazine. Washington.	.
	<b>Nat Hist.</b> —Natural History. American Museum of Natural History. New York.	.
	<b>Nat. Siciliano.</b> —Il Naturalista Siciliano. Palermo.	.
	<b>Nat. Tijdschr. Nederlandsch-Indië.</b> —Natuurkundig Tijdschrift voor Nederlandsch-Indië. Batavia.	.
	<b>Nature.</b> —London.	.
	<b>Nature.</b> —Paris.	.
	<b>Naturhist. Tidsskr.</b> —Naturhistorisk Tidsskrift. Kjøbenhavn.	.
	<b>New S. Wales Nat. Club.</b> —New South Wales Naturalists Club. Sidney.	.
	<b>Mem.</b> —Memoirs.	—
	<b>New York State Mus.</b> —New York State Museum. Albany.	.
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	<b>New Zealand Inst.</b> —New Zealand Institute. Wellington.	.
	<b>Trans.</b> —Transactions and Proceedings.	—
	<b>New Zealand Journ. Sci. Tech.</b> —New Zealand Journal of Science and Technology. Wellington.	.
	<b>Norsk. FiskTid.</b> —Norsk Fiskeritidende. Kjøbenhavn.	.
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	<b>Oester. Fisch. Zeit.</b> —Oesterreichsches Fisherei-Zeitung. Wien.	.
	<b>Open Court.</b> —Chicago.	.
	<b>Outlook.</b> —New York.	.
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	<b>Pacific Biol. Sta.</b> —Pacific Biological Station. Biological Board of Canada. Nanaimo.	.
	<b>Prog. Rept.</b> —Progress Report.	—
	<b>Pacific Fish.</b> —Pacific Fisherman. Seattle.	.
	<b>Pacific Fish. Stat. No.</b> —Pacific Fisherman Statistical Number. Seattle.	.
	<b>Pacific Sci. Fish. Inst.</b> —Pacific Scientific Fisheries Institute. Vladivostok.	.
	<b>Bull.</b> —Bulletin.	—
	<b>Pacific Sci. Fish. Res. Sta.</b> —Pacific Ocean Scientific Fishery Research Station. Vladivostok.	.
	<b>Bull.</b> —Bulletin.	—
	<b>Pan-Pacific Res. Instn.</b> —Pan-Pacific Research Institution. Honolulu.	.
	<b>Journ.</b> —Journal.	—
	<b>Pêch. Marit.</b> —La Pêche Maritime. Paris.	.
	<b>Pest. Med.-Chir. Pres.</b> —Pester Medicinisch-Chirurgische Presse. Budapest.	.
	<b>Philippine Journ. Sci.</b> —Philippine Journal of Science. Philippine Islands. Bureau of Science. Manila.	.
	<b>Pop. Sci. Mon.</b> —Popular Science Monthly. New York.	.
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	<b>Queensland Mus.</b> —Queensland Museum. Brisbane.	.
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	<b>R. Acad. Cien. Barcelona.</b> —Real Academia de Ciencias y Artes de Barcelona.	.
	<b>Mem.</b> —Memorias.	—
	<b>R. Cornwall Polytech. Soc.</b> —Royal Cornwall Polytechnic Society. Falmouth.	.
	<b>Ann. Rept.</b> —Annual Report.	—
	<b>R. Instn. Cornwall.</b> —Royal Institution of Cornwall. Truro.	.
	<b>Journ.</b> —Journal.	—

**R. Phys. Soc. Edinburgh.**—Royal Physical Society of Edinburgh. .  
**Proc.**—Proceedings. —  
**R. Soc. S. Australia.**—Royal Society of South Australia. Adelaide. .  
**Trans.**—Transactions and Proceedings. —  
**R. Soc. Tasmania.**—Royal Society of Tasmania. Tasmania. .  
**Pap.**—Papers and Proceedings. —  
**R. Soc. Victoria.**—Royal Society of Victoria. Melbourne. .  
**Proc.**—Proceedings. —  
**R. Zool. Acclim. Soc. Victoria.**—Royal Zoological and Acclimatisation Society of Victoria. Melbourne. .  
**Proc.**—Proceedings. —  
**R. Zool. Soc. New S. Wales.**—Royal Zoological Society of New South Wales. Sydney. Australian Zoological Handbook.  
**Rés. Camp. Sci. Monaco.**—Résultats des Campagnes Scientifiques accomplies sur son Yacht par Albert Ier Prince Souverain de Monaco publiés sous sa Direction avec le Concours de M. Jules Richard. Monaco.  
**Revue Franç. Cons. Aliment.**—Revue Française des Conserves Alimentaires. Paris. .  
**Revue Gén. Sci.**—Revue Générale des Sciences Pures et Appliquées. Paris. .  
**Revue Marit. Colon.**—Revue Maritime et Coloniale. Ministère de la Marine. Paris. *Continued as* Revue Maritime.  
**Revue Sci.**—Revue Scientifique. Paris. .  
**Revue Sci. Nat. Ouest.**—Revue des Sciences Naturelles de l'Ouest. Paris. .  
**Revue Thérap. Midi.**—Revue Thérapeutique du Midi. Montpellier. .  
**Riv. Mens. Pesca.**—Rivista Mensile di Pesca. Società Lombarda per la Pesca e l'Acquicoltura. Pavia.

## S

**S. African Mus.**—South African Museum. Cape Town. .  
**Ann.**—Annals. —  
**S. Calif. Acad. Sci.**—Southern California Academy of Sciences. Los Angeles. .  
**Bull.**—Bulletin. —  
**Sci. American.**—Scientific American. New York. .  
**Sci. Mon.**—Scientific Monthly. New York. .  
**Scotland Fish. Bd.**—Fishery Board for Scotland. Edinburgh. .  
**Ann. Rept.**—Annual Report. —  
**Sci. Invest.**—Scientific Investigations. —  
**Scripps Instn. Oceanogr.**—Scripps Institution of Oceanography. La Jolla, California. .  
**Bull. Tech. Ser.**—Bulletin. Technical Series. —  
**Smithson. Instn.**—Smithsonian Institution. Washington, D. C. .  
**Misc. Coll.**—Miscellaneous Collections. —  
**Soc. Acad. Nantes.**—Société Académique de Nantes et du Département de Loire-Inférieure. .  
**Ann.**—Annales. —  
**Soc. Aqu. Pêch.**—Société Centrale d'Aquiculture et de Pêche. Paris. .  
**Bull.**—Bulletin. —  
**Soc. Arts.**—Society of Arts. London. .  
**Journ.**—Journal. —  
**Soc. Biol. Paris.**—Société de Biologie. Paris. .  
**C. R.**—Comptes Rendues Hebdomadaire des Séances et Mémoires. —  
**Soc. Chem. Ind.**—Society of Chemical Industry. London. .  
**Journ.**—Journal. —  
**Soc. Española Hist. Nat.**—Sociedad Española de Historia Natural. Madrid. .  
**An.**—Anales. —  
**Bol.**—Boletín. —  
**Mem.**—Memorias. —  
**Soc. Ital. Sci. Nat.**—Società Italiana di Scienze Naturali e Museo Civico di Stori Naturale. Milan. .  
**Atti.** —  
**Soc. Linn. Maine-et-Loire.**—Société Linnéenne du Département de Maine-et-Loire. Angers. .  
**Ann.**—Annales. —

<b>Soc. Nat. Acclimat.</b> —Société Nationale d'Acclimatation de France. Paris.	.
<b>Bull.</b> —Bulletin. Revue des Sciences Naturelles Appliquées.	—
<b>Soc. Nat. Napoli.</b> —Società di Naturalisti in Napoli.	.
<b>Boll.</b> —Bollettino.	—
<b>Soc. Océanogr. France.</b> —Société d'Océanographie de France. Paris.	.
<b>Bull.</b> —Bulletin.	—
<b>Soc. Philom.</b> —Société de la Philomathique de Paris. Paris.	.
<b>Bull.</b> —Bulletin.	—
<b>C. R.</b> —Compte-Rendu.	—
<b>Soc. Portugaise Sci. Nat.</b> —Société Portugaise des Sciences Naturelles. Lisbonne.	.
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<b>Soc. Sci. Arcachon.</b> —Société Scientifique d'Arcachon.	.
<b>Trav.</b> —Travaux des Laboratoires.	—
<b>Soc. Sci. Hist. Nat. Corse.</b> —Société des Sciences Historiques et Naturelles de la Corse. Bastia.	.
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<b>Soc. Sci. Nat. Maroc.</b> —Société des Sciences Naturelles de Maroc. Maroc.	.
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<b>Soc. Sci. Nat. Ouest France.</b> —Société des Sciences Naturelles de l'Ouest de la France. Nantes.	.
<b>Bull.</b> —Bulletin.	—
<b>Soc. Tosc. Sci. Nat. Pisa.</b> —Società Toscana di Scienze Naturali di Pisa. Pisa. <b>Atti.</b>	.
<b>Soc. Zool. France.</b> —Société Zoologique de France. Paris.	.
<b>Bull.</b> —Bulletin.	—
<b>Spain Inst. Español Oceanogr.</b> —Spain. Ministerio de Marina. Dirección General de Pesca. Instituto Español de Oceanografía. Madrid.	.
<b>Bol. Pescas.</b> —Boletín de Pescas.	—
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<b>Spain Mar. Merc. Pesc.</b> —Spain. Marina Mercante y de la Pesca Marítima. Madrid.	.
<b>An. Estadís.</b> —Anuario Estadístico.	—
<b>St. Bartholomew's Hosp. Journ.</b> —St. Bartholomew's Hospital Journal. London.	.
<b>St. Nicholas Mag.</b> —St. Nicholas Magazine. New York.	.
<b>Sta. Aqul. Boulogne-sur-Mer.</b> —Station Aquicole de Boulogne-sur-Mer.	.
<b>Ann.</b> —Annales.	—
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<b>Bull.</b> —Bulletin des Travaux.	—
<b>Sta. Biol. Arcachon.</b> —Station Biologique d'Arcachon. Université de Bordeaux et Société Scientifique d'Arcachon. Bordeaux.	.
<b>Bull.</b> —Bulletin.	—
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<b>Trav.</b> —Travaux.	—
<b>Sta. Océanogr. Salambô.</b> —Station Océanographique de Salambô. Carthage.	.
<b>Bull.</b> —Bulletin.	—
<b>Stanford Univ.</b> —Stanford University. Palo Alto.	.
<b>Contrib. Biol. Hopkins Lab.</b> —Contributions to Biology from the Hopkins Seaside Laboratory.	.
<b>Publ. Univ. Ser.</b> —Publications. University Series.	—
<b>Svenska VetAkad.</b> —Svenska Vetenskapsakademien. Stockholm.	.
<b>Öfver.</b> —Öfversigt af Förhandlingar.	—
<b>Switzerland Lebensm. Hyg.</b> —Gebiete der Lebensmitteluntersuchung und Hygiene. Bern.	.
<b>Mitt.</b> —Mitteilungen.	—
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<b>Tech. Mus. Sydney.</b> —Technical Museum. Sydney.	.
<b>Tech. Ed. Ser.</b> —Technical Education Series.	—
<b>Tokyo Coll. Agric.</b> —Tokyo. Imperial University. College of Agriculture.	.
<b>Journ.</b> —Journal.	—

**Treubia.**—Recueil de Travaux Zoologiques, Hydrobiologiques et Océanographiques. Batavia.

## U

**U. S. B. F.**—United States Bureau of Fisheries. United States Department of Commerce. Washington, D. C.

**Bull.**—Bulletin. —

**Mem. Ser.**—Memorandum Series. —

**U. S. Comm. Fish.**—United States Commissioner of Fisheries. Washington, D. C. .

**Rept.**—Report. —

**U. S. D. A.**—United States Department of Agriculture. Washington, D. C. .

**Bull.**—Bulletin. —

(This department includes the United States Bureau of Fisheries.) —

**U. S. D. C.**—United States Department of Commerce. Washington, D. C. .

**Fish. Sci. Trade.**—Fisheries Science and Trade. —

**Fish. Serv. Bull.**—Fisheries Service Bulletin. —

**Food. Round World.**—Foodstuffs Round the World. Fishery News. —

**U. S. Nat. Mus.**—United States National Museum. Washington, D. C. .

**Bull.**—Bulletin. —

**Proc.**—Proceedings. —

**Union S. Africa Fish. Mar. Biol. Surv.**—Union of South Africa. Fisheries and Marine Biological Survey. Pretoria.

**Rept.**—Report. —

**Univ. Calif.**—University of California. Berkeley. .

**Publ. Health.**—Publications in Public Health. —

**Publ. Zool.**—Publications in Zoology. —

## W

**Wernerian Nat. Hist. Soc.**—Wernerian Natural History Society. Edinburgh. .

**Mem.**—Memoirs. —

**West. Can. Pack.**—Western Canner and Packer. San Francisco. .

**West Coast Fish.**—West Coast Fisheries. Formerly California Fisheries. San Pedro, California. .

**Wissen. Meeresunter.**—Wissenschaftliche Meeresuntersuchungen. Biologische Anstalt auf Helgoland. Kommission zur Wissenschaftlichen Untersuchungen der Deutschen Meere in Kiel. Berlin. .

**Abt. Kiel.**—Abteilung Kiel. —

## Y

**Yacht.**—Le Yacht. Paris. .

**Zeitschr. Ang. Chemie.**—Zeitschrift für Angewandte Chemie. Deutsche Gesellschaft für Angewandte Chemie; Verein Deutschen Chemiker. Berlin; Leipzig. .

**Zool. Inst. Univ. Wien.**—Zoologischen Institut der Universität Wien und der Zoologischen Station in Triest. Wien. .

**Arb.**—Arbeiten. —

**Zool. Soc. London.**—Zoological Society of London. London. .

**Proc.**—Proceedings. —

**Trans.**—Transactions. —

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Cockerell, 1915.	+
Ogilby, 1916.	+
Waiite, 1916.	+
<b>ANATOMY</b>	-
<i>Sardina caerulea</i>	+
of cranium	+
Starks, 1926.	+
of muscles	+
Greene and Greene, 1915.	+
<i>Sardina melanosticta</i>	+
of cranium	+
Kishinouye, 1907.	+
<i>Sardina pilchardus</i>	+
of air bladder and ear	+
Ridewood, 1891.	+
of digestive organs	+
Day, 1882.	+
of pectoral girdle	+
Goodrich, 1922.	+
of skeleton	+
Matthews, 1887.	+
of vertebral column	+
Lombardo, 1884.	+
Used in classification	+
Chabanaud, 1926.	+
Cuvier and Valenciennes, 1831.	+
Steuer, 1908.	+
Thompson, W. F., 1926.1.	+
Wilgoby, 1885.	+
<b>ARTIFICIAL FERTILIZATION</b>	*
Cunningham, 1888, 1893 (first successful attempt described).	+

**B**  
**BACTERIOLOGY OF CANNED SARDINES.** See Canning, Bacteriology.

**BAIT**

**Artificial "rogue"**

Delidon, 1869.  
Fahre-Domergue, 1908.2.  
Foulon, 1908.  
Landrieu, 1904.  
Le Bour, 1909.  
Odin, 1908.  
Péch. Marit., 1927.3.  
Potigny, 1908.  
Raulin, 1925.2.  
Seilbac, 1903.

**Certain kind detrimental to fish**

Kerzouf, 1917.

**History of use**

Landrieu, 1904.

**In general**

Bull. Trim. Pêch. Marit., 1911.2.  
Launette, 1888.  
Seilbac, 1903.  
Smith, H. M., 1902.

**Price of**

Pérad, 1913.3.

**BEHAVIOR**

Allen, W. E., 1920, 1930.

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Allen, E. J., 1920.

Buchanan-Wollaston, 1911.

Buen, F., 1925, 1927.1, 1927.3, 1927.4, 1929.3, 1930.

Clark, F. N., 1928, 1930.2.

Clark, R. S., 1920.

Cligny, 1913.

Ehrenbaum, 1927.

Fage, 1913, 1920.2.

Lang and Fellers, 1929.

Le Gall, 1928.1, 1928.2.

Navarro, 1926.

Repers, 1906.

Thompson, W. F., 1926.1.

Weber, 1921.

**BOATS**

**California**

Conner, 1931.

**Cost of equipping in France**

Pêch. Marit., 1926.3.

**France**

Allary, 1913.

Fish. Gaz., 1920.

Gerville-Réache, 1888.

Guyader, 1926.

Hérubel, 1919.

Larousse Universel, 1923.

Mader, 1909.

Raulin, 1925.

Roche, 1894.1.

Roche, 1913.

**BY-PRODUCTS**

**Meal**

Manning, 1930.

Pacific Fish., 1917.2.

Scotfield, N. B., 1919.2, 1921.2.

**Oil**

Atco Fish. News, 1925.

Brandes, 1838.

C., J., 1826.

Canadian Fish., 1929.5.

Day, 1880.

Denstedt, 1929.

Dunn, Max S., and Hollombe, 1927.

Hjort, 1913.

Langton, 1923.

Lesch and Goding, 1931.

Pacific Fish., 1927.1, 1931.5.

**Oil and Meal**

Canadian Fish., 1928, 1929.1.

Dahl, 1920.

Dill, 1921.1.

Dumont, 1919.

Hall, 1898.

Hinard, 1929.

Pacific Fish., 1919.2, 1924.3, 1926.2, 1926.3, 1928.5, 1931.2.

Pérad, 1913.2.

Scotfield, W. L., 1921.

Thompson, W. F., 1921.6.

Tressler, 1923.

Weber, 1921.

**C**

**CANNERS**

**Association in California**

Pacific Fish., 1929.6, 1930.1.

West Coast Fish., 1930.6, 1930.8.

**List of firms in California**

Pacific Fish., 1920.2.

West Coast Fish., 1930.1.

**CANNING**

**Analysis of oil used**

Beard, 1922.

Bull and Sæther, 1910.

Coudraes, 1918.

Wewers, 1930.

**Bacteriology**

Asché, 1894.

Cathart, 1906.

Hinard and Boury, 1930.

Obst, 1919.

Sadler, 1918, 1921.

**Chemical changes**

Weber and Wilson, 1919.

**Costs**

Fay, 1929.

Pérad, 1913.2.

West Coast Fish., 1930.3.

**Experiments**

Beard, 1922.

Dieuzeide and Argilas, 1928.

Dill, 1921.4.

Fish. Gaz., 1924.

Pacific Fish., 1930.5.

U. S. D. C. Fish. Serv. Bull., 1922.1, 1922.2.

Weber, 1921.

**History**

**California**

Brown, C. M., 1930.

U. S. Tariff Comm., 1925.

West Coast Fish., 1930.2.

**Europe**

Le Bail, 1909.

**France**

Libaudière, 1909.

Odin, 1894, 1895.

Quizile, H., 1926.1.

Smith, H. M., 1896.

**Maine**

Earll, 1887.2.

Earll and Smith, 1889.

Hall, 1898.

McFarland, 1911.

**Improvements**

Pacific Fish., 1919.3, 1926.1, 1929.9, 1930.4.

Weber, 1921.

**Machinery**

Beard, 1928.

Hühlein, 1931.

Pacific Fish., 1921.4, 1926.1, 1928.1, 1928.2.

West Coast Fish., 1929.8.

**Methods****Adriatic**

Krisch, 1900.

**California**

Beard, 1921, 1923, 1924, 1925, 1928.

Brown, C. M., 1930.

Calif. Fish Game, 1916.1.

Cobb, 1919.

Collins, J. H., 1924.

Dahl, 1920.

Fay, 1929.

Fish. Gaz., 1918.

Griffin, 1904.2.

Hawkins, 1929.1.

Lang, 1929.

Lang and Dean, 1928.1, 1928.2.

Lemy and Montarol, 1918.

Pacific Fish., 1905, 1917.1, 1917.3, 1918.1, 1918.5, 1924.2, 1926.1, 1928.1, 1929.9, 1930.2, 1930.3, 1930.5.

Pêch. Marit., 1928.3.

Sette, 1925, 1926.2.

Smith, H. M., 1895.

Starks, 1918.

Taylor, 1924.

Thompson, W. F., 1921.6.

Tressler, 1923.

U. S. Tariff Comm., 1925.

West Coast Fish., 1930.3, 1931.2.

**Canada**

Ayard, 1918.

Beard, 1928.

Calder, 1916.

Canadian Fish., 1919.

**Chile**

Castillo, 1912.

**England**

Bertram, 1869.

Graphic, 1880.

Pacific Fish., 1904.1.

Smith, W. A., 1883.2.

**Europe**

American Fish Culturist, 1904.

Beard, 1928.

**France**

Amieux, 1929.

Autran, 1912.

Baudouin, 1888, 1893.2.

Benoit, 1912.

Boyer, 1913.

Bull. Trim. Pêch. Marit., 1912.2.

Caye, 1903.

Chauvin, 1909.

Cligny, 1913.

Collins, J. H., 1924.

Dumont, 1919.

Fish. Tid., 1882.

Fryer, 1887.

Jacobson, 1883.

Kergorlay, 1929.

Lemy, 1901.

Moniteur de la Pisciculture, 1886.

Péard, 1913.2.

Raveret-Wattel, 1909.

Roché, 1894.2.

Saint-Léon and Seilhac, 1913.

Sauvage, 1865.

Seilhac, 1903.

Simmonds, 1879.

Smith, H. M., 1902.1, 1904, 1909.

Smith, W. A., 1883.2.

Stahmer, 1913.

Tressler, 1923.

**India**

Nicholson, 1921.

**Italy**

Pavone, 1926.

**Java**

Lengerich, 1922.

**Maine**

Beard, 1928.

Bull. Trim. Pêch. Marit., 1912.2.

Cobb, 1919.

Collins, J. H., 1924.

Earll, 1887.2.

Earll and Smith, 1889.

Fish. Gaz., 1925.

Griffin, 1904.2.

Hall, 1898.

McFarland, 1911.

Pêch. Marit., 1928.3.

Sette, 1926.2.

Steverson, 1899.

Tressler, 1923.

Weber, 1921.

**Norway (sprats)**

Bol. Pesca, 1920.2.

Fish Trades Gaz., 1912.

Gravel, 1922.

Stahmer, 1913.

Tressler, 1923.

**Philippine Islands**

Seale, 1914, 1916.

**Portugal**

Fish Trades Gaz., 1931.

Hühlein, 1931.

Stahmer, 1913.

**Spain**

Albert I, 1887.

Brown, C. L., 1918.

Buen, F., 1922.2.

Stahmer, 1913.

Lengerich, 1922.

**United States**

Canning Trade, 1914.

Fish. Gaz., 1925.

**Possibilities in****Puget Sound**

Pacific Fish., 1903.

Swan, 1894.

**New South Wales**

Scotfield, N. B., 1925.

**New Zealand**

Thomson, J. A., 1918.

**Statistics****California**

Calif. Dept. Comm. Fish., 1919.2, 1920.2, 1923.1, 1928.1.

Calif. Fish Game, 1916.2.

Pacific Fish., 1918.6, 1920.2, 1930.4.

West Coast Fish., 1929.8.

**Tins**

Brown, C. L., 1918.

Dyrenforth, 1887.

Hall, 1898.

Pacific Fish., 1917.3, 1918.1.

Wheeler, 1917.

**Trade-marks****Maine and California**

Pacific Fish., 1918.2.

**CHEMICAL COMPOSITION**

Brocklesby and Denstedt, 1930.

Clark, E. D., and Clough, R. W., 1926.

Dill, 1921.1, 1921.2, 1921.3, 1926, 1929.

Dunn, Max S., 1926.

Dunn, Max S., and Hollombe, 1927.

Finn, 1931.

Hinard, 1929.

Johnstone, 1919.

Langton, 1923.

Maljean, 1894.

Manning, 1930.

Mitchell, 1883.

Oku, 1904.

Pacific Fish., 1927.1.

Pentegoff and Niankovskaya, 1928.

Pérard, 1909.2.

Seskiné and Akiyama, 1926.

Suzuki and Mihata, 1912.

Taylor, 1926.

Thomas, 1926.

Tressler, 1923.

Tressler and Wells, 1925.

Von Fellenberg, 1923.

Weber and Wilson, 1919.

Wells, 1925.

Wewers, 1930.

**CLASSIFICATION**

Buen, F., 1927.3.

Chabnanand, 1926.

Cligny, 1913.

Cuvier and Valenciennes, 1831.

Hubbs, 1929.

Günther, 1868.

Jordan, 1923.

Sedgwick, 1905.

Steuer, 1908.

**CLUPANODON CAERULEUS.** See *Sardina caerulea*.

**Authors using former name**

Breder, 1928.

Gilbert, 1896, 1899.

Greene and Greene, 1915.

Holder, 1912.

Jordan and Evermann, 1896.1, 1908.

Jordan and Starks, 1895.

Starks, 1911.

**CLUPANODON MELANOSTICTUS.** See *Sardina melanosticta*.

**Authors using former name**

Günther, 1868.

Jordan and Snyder, 1901.

McCoy, 1867.

**CLUPANODON NEOPILCHARDUS.** See *Sardina neopilchardus*.

**Authors using former name**

Fowler, 1911.

Roughly, 1916.

Stead, 1896, 1908.

Waite, 1899, 1904, 1905.

**CLUPANODON PILCHARDUS.** See *Sardina pilchardus*.

**Authors using former name**

Cockerell, 1914.

Risso, 1826.

**CLUPANODON PSEUDOHISPANICUS.** See *Sardina pseudohispanicus*.

**Authors using former name**

Cockerell, 1914.

Evermann and Kendall, 1900.

Evermann and Marsh, 1902.

Fowler, 1911.

Jordan and Evermann, 1896.1, 1908.

Kendall, 1908.

Linton, 1901.

Smith, H. M., 1898.

Summer, Osborn and Cole, 1913.

Weymouth, 1910.

**CLUPANODON PUNCTATUS.**

**Description**

Regan, 1917.

**Distribution**

Regan, 1917.

**Synonymy**

Regan, 1917.

**CLUPANODON SAJAX.** See *Sardina sajax*.

**Authors using former name**

Albott, 1900.

Fowler, 1916.

**CLUPANODON SARDINA.** See *Sardina pilchardus*.

**Authors using former name**

Risso, 1826.

**CLUPANODON THRISSA.**

**Description**

Regan, 1917.

**Distribution**

Regan, 1917.

**Synonymy**

Regan, 1917.

**CLUPEA****Description**

Gill, 1862.

**CLUPEA CAERULEA-VITTATA.**

**Coloration**

Richardson, 1845.

**Description**

Richardson, 1845.

**Recorded from Japan**

Richardson, 1845.

**CLUPEA CAERULEUS.** See *Sardina caerulea*.

**Authors using former name**

Jordan and Evermann, 1896.2.

Meek, 1916.

**CLUPEA FIMBRIATA.**

**Mentioned**

Homell, 1910.

**Migrations**

Homell, 1910.

**CLUPEA LILE.****Mentioned**

Homell, 1910.

**Migrations**

Homell, 1910.

**CLUPEA LONGICEPS.** See *Sardinella longiceps*.

**Authors using former name**

Homell, 1910.

**CLUPEA MELANOSTICTA.** See *Sardina melanosticta*.

**Authors using former name**

Günther, 1868.

Kishinouye, 1907.

McCoy, 1867.

Seskiné and Akiyama, 1926.

Tenninck and Schlegel, 1850.

**CLUPEA NEOPILCHARDUS.** See *Sardina neopilchardus*.

**Authors using former name**

Klunzinger, 1880.  
 McCulloch, 1911.  
 Steindachner, 1879.  
**CLUPEA OCELLATA**. See *Sardina ocellata*.  
**CLUPEA PILCHARDUS**. See *Sardina pilchardus*.  
**CLUPEA PSEUDOHISPANICA**. See *Sardina pseudohispanica*.  
**CLUPEA SAJAX (Sagax)**. See *Sardina Sajax*.  
**CLUPEA SARDINA**. See *Sardina pilchardus*.  
**Authors using former name**  
 Bean, 1880.  
 Blanchère, 1868.  
 Caillio, 1855.  
 Calderón, 1889.  
 Devedjian, 1926.  
 Gobin, 1891.  
 Graeffe, 1886.  
 Jordan, 1887.3.  
 Lacépède, 1829.  
 Lombardo, 1884.  
 Lowe, R. T., 1837.  
 Machado, 1857.  
 Perugia, 1866.  
 Risso, 1810.  
 Simmonds, 1879.  
**CLUPEA SARDINITES**.  
**Description**  
 Kramberger-Gorjanovic, 1883.  
 Woodward, 1901.  
**Fossils from**  
**Lower Oligocene, Croatia**  
 Woodward, 1901.  
**Oligocene, Rumania**  
 Pauc, 1929.  
**Synonymy**  
 Woodward, 1901.  
**Tertiary of Croatia**  
 Kramberger-Gorjanovic, 1883.  
**CLUPEA SENEGALENSIS**.  
**Listed from west coast of Africa**  
 Gravel and Bouyat, 1906.  
**COMMERCIAL CATCH ANALYSIS**  
**Detailed discussion**  
 Thompson, W. F., 1926.1.  
**COMMON NAMES**  
**Africa**  
 Joubin and Le Danois, 1924.  
**Australia**  
 McCulloch, 1919.  
**England**  
 Day, 1880.  
 Le Danois, 1913.  
**Europe**  
 Blanchère, 1868.  
 Caraffa, 1929.  
 Carus, 1889.  
 Cligny, 1913.  
 Hoek, 1914.2.  
 Joubin and Le Danois, 1924, 1928.  
 Lacépède, 1829.  
 Moreau, E., 1881.  
**France**  
 Guéin-Garnier, 1912.  
 Le Danois, 1913, 1921.  
**Italy**  
 Canestrini, 1871.  
**Japan**  
 Jordan and Hubbs, 1925.  
**Korea**  
 Mori, 1930.  
**Portugal**  
 Lowe, R. T., 1837.  
**Spain**  
 Buen, F., 1922.1, 1926.2.  
 Buen, O., 1910, 1912.1, 1912.2.  
 Pardo Garcia, 1919, 1921.  
**Turkey**  
 Bauer, 1921.  
**CONFLICT BETWEEN FISHERMEN, BUYERS AND CANNERS—FRANCE**  
 Bull. Trim. Pêch. Marit., 1911.2, 1913.2, 1913.3.  
 Guyader, 1926.  
 Pêch. Marit., 1927.1, 1927.2, 1928.4, 1929.1.  
 Petit, Benoit, Rivoal and Touchard, 1913.  
 Saint-Léon and Seilhac, 1913.  
**CONSERVATION OF FISHERIES**  
**California**  
 Calif. Fish., 1929.1.  
 Higgins, 1923.  
 Scofield, N. B., 1923.2.  
 Skogsberg, 1925.  
 Thompson, W. F., 1922, 1923, 1926.  
 Thompson, W. F., and Higgins, 1923.  
**France**  
 Fabre-Domergue, 1896.  
 Mader, 1909.  
 Odin, 1894.  
 Renduel, 1888.  
 Ropers, 1906.  
**COST OF CANNING EQUIPMENT—FRANCE**  
 Fay, 1929.  
 Péard, 1913.2.  
 West Coast Fish., 1930.3.  
**COST OF FISHING EQUIPMENT—FRANCE**  
 Pêch. Marit., 1926.3.  
**D**  
**DECLINE IN FISHERY**  
**California**  
 Clark, F. N., 1930.1.  
 Lindner, 1930.2.  
 Scofield, N. B., 1928.2.  
**France**  
 Baudouin, 1893.2.  
**Portugal**  
 Nobre, 1895.1.  
**DEPLETION OF FISHERY**  
**California**  
 Scofield, N. B., 1921.2.  
 Scofield, W. L., 1930.1.  
**France**  
 Pouchet, 1887.3, 1891.2.  
**DERIVATION OF NAME**  
**French**  
 Cligny, 1913.  
**Pilchard**  
 Houghton, W., 1883.  
**Sardine**  
 Hjort, 1913.  
**DESTRUCTIVE FISHING GEAR**  
**Algeria**  
 Roché, 1894.3.  
**California**  
 Bonnot, 1930.  
 Scofield, N. B., 1924.1.  
 Skogsberg, 1925.  
 Thompson, W. F., and Higgins, 1923.  
**France**  
 Delcassé, 1912.  
 Le Bail, 1912.  
 Pêch. Marit., 1923.  
 Pouchet, 1887.3.  
**Portugal**  
 Nobre, 1895.1.  
**DISASTER TO BOATS**  
**Wreck caused by large school sounding in net**  
 Calif. Fish., 1929.2.  
**Wrecks and fires**  
 Phillips, 1930.1.  
**DISEASE IN MAN CAUSED BY SARDINES**

Saint-Séverin, 1894.  
**DISEASE OF SARDINES**  
*Sardina pilchardus*  
 Johnstone, 1911, 1925.  
**DISTRIBUTION OF COMMERCIAL PRODUCT**  
 Argemier, 1919.  
 Berthoule, 1887.2.  
 Bullen, 1904.  
 Duhamel du Monceau, 1772.  
 Dumont, 1919.  
 Guyader, 1926.  
 Pêch. Marit., 1928.7.  
**F**  
**ECONOMIC CONDITIONS OF FACTORY WORKERS**  
 Calleja, 1930.  
 Gerville-Réache, 1888.  
 Hautot, 1930.  
 Scillace, 1903.  
 Smith, H. M., 1902.1.  
**ECONOMIC CONDITIONS OF FISHERMEN**  
**England**  
 Bertram, 1883.  
 Couch, 1835.  
**France**  
 Berthoule, 1887.2.  
 Bull. Trim. Pêch. Marit., 1911.2, 1913.2, 1913.3.  
 Calleja, 1930.  
 Ferrar, 1887.  
 Guyader, 1926.  
 Kerzoncuf, 1917.  
 Lebour, 1909.  
 Le Goffic, 1912.  
 Lemy, 1912.  
 Mader, 1909.  
 Müller, 1909.  
 Oeuvre, 1913.  
 Pêch. Marit., 1927.1, 1927.2, 1929.1.  
 Pouchet, 1887.3.  
 Ropers, 1906.  
 Scillace, 1903.  
 Smith, H. M., 1909.  
**Portugal**  
 Hüllein, 1931.  
**Spain**  
 Rodriguez, 1908.  
**EGGS**  
*Sardina caerulea*  
 Calif. Fish Game, 1929.2.  
 Pacific Fish., 1929.4.  
 Scofield, E. C., and Lindner, 1930.  
 West Coast Fish., 1929.2, 1929.3.  
*Sardina melanosticta*  
 Kamiya, 1925.  
 Kishinouye, 1907.  
*Sardina pilchardus*  
 Afalo, 1904.2.  
 Armé, 1927.  
 Barnard, 1925.  
 Biérix, 1890.  
 Buchanan-Wollaston, 1911.  
 Buckland and Walpole, 1879.  
 Buen, F., 1927.3, 1929.1, 1930.  
 Cunningham, 1888, 1891, 1893, 1896, 1912.  
 Ehrenbaum 1909, 1927.  
 Fabre-Domergue and Biérix, 1896.1, 1896.2, 1896.3.  
 Herford, 1910.  
 Holt, 1897, 1899.  
 Holt and Scott, 1897.  
 Joubin, 1913.  
 Kyle and Ehrenbaum, 1929.  
 Lebour, 1921.1.  
 Marion, 1894.1, 1894.3.  
 Meek, 1916.  
 Pouchet, 1889.1, 1889.5, 1891.1, 1891.4.  
 Prince, 1907.  
 Raffaele, 1888.  
 Roché, 1893.2.  
 Roule, 1914.  
 Russo, 1925.  
 Steuer, 1908.  
 Six sardine-like species from Java Sea  
 Delsman, 1926.  
**ENEMIES**  
*Sardina melanosticta*  
 Kishinouye, 1907.  
*Sardina pilchardus*  
 Carew, 1811.  
 Day, 1880, 1883.  
 Dunn, Manthias, 1886.  
 Smit, 1892.  
**F**  
**FAT CONTENT**  
*Sardina caerulea*  
 Dill, 1921.3.  
 Higgins, 1926.  
 West Coast Fish., 1930.5.  
*Sardina melanosticta*  
 Kishinouye, 1907.  
*Sardina pilchardus*  
 Belloc, 1930.  
 Fage, 1920.1.  
 Fage and Legendre, 1914.  
 Le Gall, 1930.1, 1930.2.  
*Sardinella longiceps*  
 Homell and Nayudu, 1924.  
**FISHERY**  
**Adriatic**  
 Faber, 1883.  
 Kirsch, 1900.  
**Africa**  
 Gruvel and Bouyat, 1906.  
**Algeria**  
 Argemier, 1919.  
 Bonnard, 1902.  
 Darboux et al., 1906.  
 Gruvel, 1926.1.  
 Peixoto, 1884.  
**British Columbia**  
 British Columbia Comm. Fish., 1919.  
 Canadian Fish., 1928, 1929.4.  
 Pacific Fish., 1927.3.  
**California**  
 Brown, C. M., 1930.  
 Calif. Bur. Comm. Fish., 1929.1, 1929.2, 1930.1, 1930.2.  
 Calif. Dept. Comm. Fish., 1916, 1917, 1919.1, 1919.2, 1920.1, 1920.2, 1921, 1921+, 1922, 1923.1, 1923.2, 1924, 1925, 1926, 1927, 1928.1, 1928.2.  
 Calif. Fish., 1929.3, 1929.4.  
 Calif. Fish Game, 1916, 1917, 1921, 1924.1, 1930.2.  
 Cobb, 1918.  
 Fielder, 1930.2.  
 Fish. News, 1930.  
 Jordan, 1887.4.  
 Lindner, 1930.2.  
 Pacific Fish., 1915-, 1926.4, 1927.3, 1928.3.  
 Scofield, N. B., 1919.3, 1921.2, 1927, 1928.2, 1929.1, 1929.2, 1929.3.  
 Scofield, W. L., 1923, 1928.1, 1928.2, 1929.2, 1929.3, 1929.4, 1930.1, 1930.3.  
 Terry, 1929.  
 Thompson, W. F., 1921.2, 1921.6, 1922.  
 U. S. Tariff Comm., 1925.  
 West Coast Fish., 1929.5, 1929.6, 1930.2, 1930.5, 1930.9.  
 Whitehead, 1929.  
 Wilcox, 1898.  
**Canada**  
 Hemming, 1919.  
**Corse**  
 Argemier, 1919.  
**England**  
 Afalo, 1904.1.

Barron, 1897+.  
 Beulacé, 1758.  
 Buckland and Walpole, 1879.  
 Bullen, 1904.  
 Cornish, 1883.1, 1870, 1872, 1880.  
 Couch, 1835, 1840.  
 Courtenay, 1837, 1840.  
 England Bd. Ag. Fish., 1906+.  
 Kyle, 1929.  
 Lemos, 1785.  
 Murie, 1903.  
 Pengelly, 1928.  
 Swinhbank and Bullen, 1914.  
**Estonia**  
 Viengkoff, 1893.  
**Europe**  
 Buen, F., 1928.1.  
 Noël de la Morinière, 1815.  
 Steuer, 1908.  
**France**  
 Amieux, 1909, 1912.  
 Argentier, 1919.  
 Arné, 1928.2, 1929.  
 Bandouin, 1888, 1893.1, 1893.2.  
 Belloc, 1930.  
 Bonassieux, 1900.  
 Bouchon-Brandeley, 1887.  
 Bouvier-Lapierre, 1887.  
 Boyer, 1912.  
 Bull. Trim. Pêch. Marit, 1911.2, 1912.2.  
 Caillio, 1855.  
 Cligny, 1913, 1914.  
 Chource, 1913.  
 Delcassé, 1912.  
 Deslandes, 1727.  
 Fabre-Domergue, 1908.1.  
 Fischerbote, 1931.  
 Fish. Gaz., 1909.  
 Gourret, 1889.1, 1894.1, 1894.2, 1894.3, 1894.4, 1894.5, 1894.6, 1894.7, 1897.  
 Héribert, 1912.  
 Kerzoncuf, 1916, 1917.  
 Larousse Universel, 1923.  
 Launette, 1876, 1882, 1887, 1888.  
 Le Bour, 1909.  
 Le Danois, 1921, 1930.  
 Lemy, 1919.2, 1926.  
 Lübbert, 1931.  
 Mader, 1909.  
 Marchis, 1930.  
 Marion, 1888, 1894.4.  
 Martinet, 1887.  
 Moreau, R., 1927.  
 Odin, 1894, 1895.  
 Ouzille, G., 1912.1, 1912.2.  
 Ouzille, H., 1926.1, 1926.2, 1926.3.  
 Pêch. Marit., 1924.4.  
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Cunningham, 1896.  
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Farnell, 1838.  
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Sauvage, 1865.  
Smith, W. A., 1892.  
Swithinbank and Bullen, 1913.

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Goode, 1903.  
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**HARENGULA PUNCTATA = CLUPEA SAJAX****Description**

Bleeker, 1853.

**HARENGULA SARDINA**. See *Sardina pseudohispanica*.

**Authors using former name**

Goode and Bean, 1880.  
Poey y Abay, 1856.

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Brown, C. M., 1930.  
Fiedler, 1930.2.  
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 Boalac, 1758.  
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 Earll, 1887.1.  
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 Sauvage, 1890.  
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 Calif. Fish., 1929.1.  
 Scofield, E. C., and Lindner, 1930.  
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 Bull. Trim. Pêch. Marit., 1911.1.  
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**For California product**  
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 Ouzille, H., 1926.4.  
**Greece**  
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**Orient**  
 Dollar, 1927.  
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**World**  
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 Cuvier and Valenciennes, 1831.  
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McIntosh and Masterman, 1897.  
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Pouchet, 1889.1, 1889.6, 1890.2.  
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**Habitat**  
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**Habits**  
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Swithinkbank and Bullen, 1913.

**Heraldic emblem**  
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**Larval and young stages**  
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Cunningham, 1889, 1891, 1893, 1896.  
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Fage, 1920.2.  
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Cligny, 1919.  
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Cunningham, 1892.3, 1892.4.  
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**Life history**  
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**Listed from**  
**Adriatic**  
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**Balearic Islands**  
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 Thompson, W. F., 1921.5.  
**Gulf of Trieste**  
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**Ireland**  
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**Morocco**  
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**North America, east coast**  
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**Portugal**  
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**Scotland**  
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**Spain**  
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**Sweden**  
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**West Indies**  
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**Metamorphosis**  
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**Migrations**  
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 Anthony, 1909.  
 Baudouin, 1893.2.  
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 Fabre-Domergue, 1896.  
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 Smith, H. M., 1892.  
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**Morphology**  
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**Ooliths**  
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**Parasites**  
**Copepods**  
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 Meek, 1916.  
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 Moreau, E., 1881.  
 Pardo Garcia, 1921.  
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**Description**  
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**Distribution**  
 Evermann and Marsh, 1902.  
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**Food**  
 Sumner, Osburn and Cole, 1913.  
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**Listed from**  
**Brazil**  
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**Florida**  
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**North America**  
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 Smith, H. M., 1898, 1902.2.  
**West Indies**  
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**Classification**  
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**Compared with herring**  
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**Description**  
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Bleeker, 1853.  
Castlenau, 1872.  
Evermann and Radcliffe, 1917.  
Gilchrist, 1909, 1913.  
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Hutton and Hector, 1872.  
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Johnston, R. M., 1883.  
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**Distribution**  
Arthur, 1883.  
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Buen, F., 1928.1.  
Evermann and Radcliffe, 1917.  
Goode, 1884, 1903.  
Günther, 1880.  
Hutton and Hector, 1872.  
Jordan and Gilbert, 1882.1, 1882.2.  
Lockington, 1881.  
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**Zetz, 1908.**

**Eggs**  
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**Food**  
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**Growth**  
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**Habits**  
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**Larvae**  
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**Listed from**

**Australia**  
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**California**  
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**Chile**  
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**Japan**  
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**New Zealand**  
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Hutton and Hector, 1872.  
Thomson, G. M., 1892.  
Thomson, J. A., 1918.  
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**North America**  
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**Pacific and Indian Oceans**  
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**Peru**  
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Evermann and Radcliffe, 1917.  
Jenyns, 1842.  
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**South Africa**  
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Gilchrist, 1909, 1913.

**Tasmania**  
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**Migrations**  
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**Nomenclature**  
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**Reproduction**  
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**Synonymy**  
Abbott, 1900.  
Castlenau, 1872.  
Delfin, 1901.  
Evermann and Radcliffe, 1917.  
Gilchrist, 1913.  
Günther, 1868.  
Jordan and Gilbert, 1882.1.  
Ogilby, 1893.  
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**SARDINA SARDINA**. See *Sardina pilchardus*.

**Authors using former name**  
Chabanaud, 1926.

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**In France**  
**Causes**  
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Baudoain, 1888.  
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France Comm. Études, 1908.  
France Min. Mar., 1908.  
Gerville-Réache, 1908.  
Gouault, 1919.  
Groupement Fabricants Français, 1905.  
Künstler, 1903.  
Launette, 1876.  
Le Goffic, 1912.  
M., 1903.  
Odin, 1894.  
Oeuvre, 1913.  
Quizile, G., 1912.1, 1912.2.  
Roché, 1893.3, 1894.1, 1894.2.  
Pérard, 1913.1, 1913.3.  
Ropers, 1906.  
Saint-Léon and Seilhae, 1913.  
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Thoulet, 1913.  
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Vaillant and Hennequy, 1888.

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 Gruvel, 1913.  
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 Launette, 1876.  
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 Le Goffic, 1912.  
 Olin, 1894.  
 Péraud, 1909.1.  
 Poigny, 1908.  
 Rodet, 1912.  
 Ropers, 1906.  
 Saint-Léon and Seilhac, 1913.  
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**Recommendations**  
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**By-products**  
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**Canning methods**  
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**Industry**  
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**Methods of fishing**  
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**Description**  
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**Distribution**  
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**Listed from New York**  
 Bean, 1903.  
**Nomenclature**  
 Berg, 1913.  
**SARDINELLA CAERULEUS**. See *Sardina caerules*.  
**Authors using former name**  
 Allen, W. E., 1920.  
 Hubbs, 1917.  
 Metz, 1912.  
 Starks and Morris, 1907.  
**SARDINELLA IMMACULATA**  
**Common names, Korean**  
 Mori, 1928.  
**Listed from Korea**  
 Mori, 1928.  
**SARDINELLA JUSSIEU**  
**Description**  
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**Synonymy**  
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**SARDINELLA LONGICEPS**  
**Description**  
 Homell and Nayudu, 1924.  
**Fat content**  
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**Fishery, Philippine Islands**  
 Montalban, 1930.  
**Food**  
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 Homell and Nayudu, 1910.  
**Growth**  
 Homell and Nayudu, 1924.  
**Migrations**  
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**Parasites**  
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**Preservation methods**  
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**Reproduction**  
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