Title
Fish Bulletin No. 36. A Bibliography of the Sardines

Permalink
https://escholarship.org/uc/item/12x9k8zd

Author
Wheeler, Genevieve Corwin

Publication Date
1931-05-01
A Bibliography of the Sardines

By

GENEVIEVE CORWIN WHEELER
One of the Earliest Printed Pictures of a Sardine
(From Rondelet, Guilemus. L'histoire entière des poissons. Lion, 1558, p. 181.)
# CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>5</td>
</tr>
<tr>
<td>AUTHORS' LIST OF TITLES</td>
<td>7</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS USED FOR PERIODICALS CITED</td>
<td>97</td>
</tr>
<tr>
<td>INDEX OF SUBJECTS</td>
<td>105</td>
</tr>
</tbody>
</table>
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 ocelleta (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 synonomy 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:


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." 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 National 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 Katheryn Karmelich who typed the manuscript and rendered valuable assistance in preparing the bulletin for printing.

May, 1931.

---

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


Scientific investigations.

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.

Suggestions for improving French sardine industry.

Collected documents relating to the sardine failure in 1912; "filets tournants," a kind of net, described; reports and information concerning the sardine question.

Present day tendencies in the French sardine canning industry.

Description of statistical methods; tables; graphs.

Outline of plan for investigation of causes of sardine migrations.

Sardina dobrogica from Black Sea described.

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, Athène, p. 31, 36, 45.
Meletta phalerica: fishing seasons; fishing methods and gear.

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.


Statistics of French fishery; temperature; density; spawning season; sexual maturity; eggs and larvae; size at different ages (age determined by scale readings).


Age and size; scale structure; two figures of scales showing growth rings; spawning.


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.


Statistics of the fishery for 1927 and 1928; races; spawning period; growth; morphological characters (number of vertebrae, length, position of dorsal fin).


Description of four specimens of Clupea sajax, including stomach contents; spawning season; distribution.


Use of "terre rouge" in salting sardines; chemical composition of substance.


Oil industry on Vancouver Island.


Bacteriology of canned sardines.


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

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

Sardinia neopilchardus listed among the most important market fish.

### 2.2. B

Methods of sardine fishing at Concarneau; methods of preservation.

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

Condition of sardine fishery.

Description and discussion of specimens showing abnormal number of scales.

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

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

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

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.

Copepod parasite of sardine.

Copepod parasite.


Methods of canning in California; food value equal to all other meats.


Experiments in canning California sardines.


Canning.


Canning processes.


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.


Discussion of sardine failure from economic point of view.


Description and map of trips made by dirigible to find sardine schools off the southwest coast of France.


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.


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).


Description of sardine.

Bérand, 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.


Recommendations for improvements in methods and gear used in French sardine fishery.
Reduction vs. canning; litigation concerning same.

**Benoit, A.** 1912. Une délégation des fabricants appuie près de M. Delcassé le voeu de leur congrès, et lui laisse 2 notes précisant leurs desiderata.
Plea for improvement of methods of fishing and canning sardines in France.

Sardinella for sardina: description; distribution.

Clupea pilchardus: migrations.

Statistics; economic conditions of fishermen; tariff.

European races of sardine based on number of vertebrae.

Sardine fishing methods and gear in England; food; salting in Cornwall and canning methods (sprat as sardines in Brittany).

Pilchard fishing methods and gear; curing methods; conditions of fishermen in Cornwall.

Clupea sajax: season of appearance; enormous quantities found dead on beach; probable intermediate host of worm parasite.

Description of sardine egg (Concarneau); no illustrations.

Clupea sardinia: description; common names in Europe; fishing methods and gear of France.

Theory that currents and temperature explain disappearance of sardine.
Harengula punctata (= Clupea sajax according to Günther, 1859): description.

Clupea ocellata recorded from Cape of Good Hope.

Food of sardine; presence of copepod Euterpes, correlated with presence of sardine.

Sardine: synonymy; description; amounts caught in Cornwall; methods of preservation in Cornwall.

Clupea pilchardus: short description.

Boletín de Pescas. See Spain. Instituto Español de Oceanografía.

Statistics of sardine fishery.

Clupea sajax listed.

Sardine fishery of Algeria.

History of commerce in sardines; fishery in France.

Sardine described and figured.

Methods of sardine fishing and gear in Brittany.

California methods of fishing and gear; purse seine thought not to be destructive of fish and of equal merit with lampara.

Booth, F. E. 1915. California anchovies can not be called sardines. Pacific Fish., 13, no. 7, p. 36.  
Letter concerning misinterpretation of labeling regulations.

Clupea pilchardus: location and number of captures.


Pilchard industry information and statistics.


Discussion of relative value of the seine and the "filet tournant" used in capture of sardines.


Condition of sardine fishery at different French ports.


Scales do not show "winter rings" on account of mild Algerian winters; body measurements (tip of mandible to center of eye) used to determine age.


Age determination can not be by scale readings because water temperature is practically the same all year; determination by measurements necessary.


Spawning period of species; duration of spawning period for individual.


Age at first spawning, thirteen months; fecundity (45,000 eggs).


Interpretation of growth rings of sardine scales with reference to growth and age.


Males do not grow as fast as females.


Correlation between storms and large catch.


Physical factors affecting vertical distribution.


Age; growth; age of first spawning.


Alosa sardina: migrations; spawning season.
Algerian fishing methods and gear.

Influence of stormy weather on drawing of sardines to surface (0–45 meters).

Sardine: statistics; season.

Length fluctuations; seasons; generalizations drawn from the daily commercial records of France taken from 1865 to 1887; no statistical tables.

Suggestions for improving French sardine fishery.

Fishing methods and gear; canning methods.

Pilchard oil.

Clupanodon caeruleus: young found in Gulf of California.

Sardinella sardina, S. macrophthalmus: description; distribution; key; figured.

Good season; some packed by salmon canners.

Report of progress of work and of expansion of reduction industry.

Outline of investigation on pilchard; length studies; determination of age by otoliths; food.

Experiments showing vitamin D potency.

Experiments on fishing methods on Moroccan coast.
Clupea pilchardus: spawning period.

Methods of fishing and gear; processes in packing; manufacture of tins.

History of canning industry at Monterey; fishing and canning methods described.

Clupea pilchardus: short description.

Brünnich, Morten Thrane. 1768. Ichthyologia Massiliensis, sistens piscium descriptiones eorumque apud incolas nomina. Accedunt spoila maris Adriatici. p. 82.

Sardine investigation to be carried on by California State Fisheries Laboratory, Terminal Island, California.

Clupea pilchardus eggs: description; where taken in English Channel; number taken; p. 234, literature cited (on fish eggs in general).

Clupea pilchardus short description; English methods of cooking and curing; methods of catch.

Statistics of pilchard fishery; spawning; pelagic eggs.

Alosa pilchardus listed from Guipuzcoa, Spain.

Clupea pilchardus: instructions for taking proportional measurements and other characteristics.

Description of "branquispines"; food; weight-length relationship.

Methods of studying sardine scales for the purpose of aging.
Clupea pilchardus: synonymy; distribution.

Clupea pilchardus called “sardina” in Spain.

Species caught with sardine; size of sardine; fishing areas; migrations; preserving and canning methods; condition of fishery; statistics.

Spawning; migrations; method of reading scales for age (Lea's method).

Age of sardine determined by the scales; literature cited.

Variation: large caudal fin.

Sardina pilchardus: synonymy; common names of Mediterranean.

Races of European sardines; life history; sexual maturity at different seasons; bibliography.

Sardina pilchardus: fluctuation in fishery at Vigo; alternating with other fishes in abundance.

Sardina pilchardus: systematic relationships; synonymy; description of eggs and larvae; keys for identification of eggs and larvae recently hatched and at three larger stages; races; sexual dimorphism; spawning season; temperature of water at spawning; spawning area; size of mature sardines; nomenclature of stages of development; growth; metamorphosis; proportion of young to adults; food of young sardines; literature cited; figures of 39 mm. and 55 mm. fish and sections to show pigmentation at five different stages.

Sardina pilchardus: European races defined; progress of sexual maturity; relation between temperature of water and spawning; vertical daily migrations; food; bibliography.

Distribution of Sardina pilchardus, S. sagax, S. neopilchardus; areas and seasons of fishery of European countries; statistics.

Description of gear and history of regulations governing it in Spain. (See Chute, 1929.1, for partial translation into English.)


**Buen, Rafael de.** 1927. An account of the work which Spain has carried out in the Atlantic Ocean and the Straits of Gibraltar. Cons. Explor. Mer. Journ., 2, no. 3, p. 281–303. Clear account of knowledge of sardine in Spain; sardine statistics (Spain); frequency curves for total length; relation between length to weight, height and width; these questions discussed and presented in graphs; migrations; spawning; study of age by means of scales; sexual development.

Clupea pilchardus: short account of English fishery and industry, and distribution of product.

Discussion and correspondence concerning conflict over substituting machines for hand-soldering sardine tins.

Sardine fishery of France; bait; cooperation of fishermen and credit arrangement.

English decision with regard to labeling sprats as sardines.

Conditions of French sardine fishery; differences between Maine (U. S. A.) and French sardine (species and manner of packing and price); recipes, for preparation of sardines, taken from Duhamel du Monceau, 1772.

Report of congress on regulations for sardine fishing and canning.

Proceedings of meetings of canners and fishermen with regard to prices paid to latter for sardines.

Report of congress on improvement of prices; regulation of factory conditions; fishing; destruction of cetaceans.

2.3. C

A fatal case of poisoning as result of eating canned sardines; symptoms and treatment given.

Clupea sardina: disappearance; résumé of life history; nomenclature; methods and gear; preservation of products.

Process of canning sardines, east coast of Canada.

Clupea sardina listed.


Sardine statistics.

1929.2. Tables showing the monthly catches landed in California by districts for the two calendar years 1926 and 1927. In The commercial fish catch of California for the years 1926 and 1927. Calif. Div. Fish Game, Fish Bull., no. 15, p. 64–87.

Sardine statistics.


Sardine statistics.


Sardine statistics.

California Department of Commercial Fisheries. 1916. Table showing amount of fish, crustaceans and mollusks taken in California waters for three months ending December 31, 1915; March 31, 1916. Calif. Fish Game, 2, p. 102, 103, 166.

Sardine statistics.


Sardine statistics.


Sardine statistics.

1919.2. Canned, cured and manufactured fishery products of California for the year 1918. Calif. Fish Game, 5, no. 4, p. 162.

Canned sardine statistics.


Sardine statistics.

1920.2. Canned, cured and manufactured fishery products of California for the year 1919. Calif. Fish Game, 6, no. 2, p. 96, 97. Also in Pacific Fish., 1920, 18, no. 4, p. 70, 71.

Sardine statistics.


Sardine statistics.


Sardine statistics.


Sardine statistics.


Sardine statistics.
Sardine statistics.

Sardine statistics.

Sardine statistics.

Sardine statistics.

Sardine statistics.

Statistics of California sardine canneries.

Sardine statistics.

**California Fish and Game.** 1916.1. New fish cannery on San Diego Bay. Calif. Fish Game, 2, no. 1, p. 40.
Notice of a new sardine cannery starting to operate.

Sardine statistics; amounts canned in California, 1915.

Increasing output of California sardine industry.

Cooperation between naval airplane service and canneries; location of sardine schools by airplane scouts.

Editorial comment on this number of the magazine; comparison of sardine catch and value of California, Maine, Portugal, France and Norway for 1919.

General outline of research program for California sardine.

1922.2. Hearings held on use of food fish in reduction plants. Calif. Fish Game, 8, p. 186.
Sardine canneries closed for 90 days as penalty for reduction of fish in excess of amount allowed by law.

1924.1. February nets large catch of sardines. Calif. Fish Game, 10, no. 3, p. 135.
Sardine fishery statistics.

1924.2. Commission will appeal decision. Calif. Fish Game, 10, no. 4, p. 189.
Litigation in connection with reduction of sardines to fertilizer.

August 6 set for opening date for 1928 sardine season in Monterey, California.

Record of three cases in California concerned with reduction of sardines to fertilizer.
First discovery of sardine eggs by E. C. Scofield, June, 1929, five miles off coast of southern California.

1929.3. An act regulating the packing of sardines in Maine. Calif. Fish Game, 15, no. 3, p. 281.
Regulations for quality of canning "sardines" (small herring); license for canneries. (Taken from U.S.D.C., Fish. Sci. Trade, 1929, 1, no. 5.)

Boats to operate outside three-mile limit in order to evade sardine reduction laws.

1930.2. Bureau of commercial fisheries. Calif. Fish Game, 16, no. 1, p. 70.
Cannery and market conditions; lampara operators make gear into modified purse seine for sardines.

Problems still unsolved in connection with life history and conservation of sardine.

1929.2. Sardines wreck boat and eight fishermen. Calif. Fish., 1, no. 8, p. 21.
Accident caused by large school sounding in net.

Sardine season at Monterey.

1929.4. The season's sardine catch at Monterey breaks all previous records. Calif. Fish., 1, no. 10, p. 5.
Sardine season at Monterey; statistics.

Recipes for cooking sardines.

Proceedings in litigation concerning reduction of sardines to fertilizer.

Description of cooperative organization of sardine fishermen and canneries.

Annual report containing sardine statistics.

Canada. Fisheries Branch. Annual report.
Statistics of sardine fishery of Canada.

Methods of fishing and canning in Canada. (English, French and Spanish text in parallel columns.)

1928. Pilchard reduction, a great industry. Great runs of fish in the season. Canadian Fish., 15, no. 12, p. 27.
Industry of British Columbia.

Oil and meal industry of British Columbia.
1929.2. Investigate pilchard and herring for intelligent regulation. Canadian Fish., 16, no. 5, p. 33. Canadian federal government to cooperate with British Columbia.

1929.3. Pilchard and herring to be surveyed. Canadian Fish., 16, no. 8, p. 31. Commission appointed: federal government of Canada represented by Dr. W. A. Clements, and British Columbia by Hon. J. P. Babcock; Dr. John L. Hart in actual charge of investigations.


1930. B. C. fishing regulations revised by federal government. Changes affect pilchard, herring and salmon fisheries. Canadian Fish., 17, no. 3, p. 32. Decision to make July 5 opening date for pilchard season; closing date not mentioned.


Clupea pilchardus: synonymy; description; distribution; common names of Europe.

Suggestions for discovering sardine schools by hydroplane.

Clupea sajax: methods of canning in Chile.

Clupea ocellata: description.

Clupea sajax: description; synonymy.

Clupea sagax recorded.

Food of sardine.

Food; parasites (copepods and nematodes).

Food of sardines of Start Point, Devonshire; parasites.

Food of sardines of San-Sébastien, Spain.

Graph showing amounts of sardines taken in 1928 and 1929.
Reclassification of Sardina as given by Regan according to Antipa (1906) on basis of anatomy of hyobranchial apparatus; genera discussed: Clupeonemia, Sardinella, Amblygaster; species of Sardina recognized: Sardina pilchardus, S. sardina, S. neopilchardus, S. sajax.

Sardine failure from industrial point of view; improvement of methods of selling fish to canneries, and of canning.

Description of pilchard migrations; season of appearance on English coast; food.

Food values of sardines; statistics of pack from 1912 to 1930.

Description of ancient Spanish net, taken from Buen, Fernando de (1928.2); regulations of fishery in 1750.

Extension of sardine fishing area in northern California.

1930. A quest for the eggs of cannery fish. West Coast Fish., April, p. 40.
Progress and plans for sardine research of California State Fisheries Laboratory.

Sardine: chemical composition.

Clark, E. D., and Davi, H. D. 1918. Preservation of sardines by smoking. Pacific Fish, 18, no. 10, p. 25, 56, 58, 60.
Methods of smoking clearly described and costs given in detail.

Statistical methods described; a list of 85 titles on general subject of weight-length relationship.

1930.1. Fishing localities off San Pedro from 1919 to 1929 for the California sardine (Sardina caerulea). In Fishing areas along the California coast for the sardine (Sardina caerulea). Calif. Div. Fish Game, Fish Bull., no. 25, p. 28–39.
Fishermen have to go farther than formerly, showing decline of inshore fishery; statistics; maps; graphs.

Seasons from 1919–1929 studied; an average of larger fish for last five years probably due to fish that have grown to maximum size; statistics; graphs; literature cited.

Length studies and their bearing on prediction of fishery.


Clupea pilchardus: larval stages.


Sardina pilchardus: number of hauls; sizes of fish; depths of catch; bibliography.


Synonomy; classification; common French names (derivation); history of fishery and of canning and preserving sardines; bibliography on sardine in general; list of sardine references in Bull. Trim. Pêch. Marit. from 1901–1912.


Study of historical documents relating to French sardine fishery.


Spawning season; size of fish.


Economic conditions in French sardine fishery; suggestions for increasing yield of fishery and bettering conditions in industry. (For discussion of this report, see p. 351 of this number, meetings of February 15 and March 6.)


Sardine importations and statistics.


Statistics of California sardine fishery.


Sardine canning methods (California and Maine).


Clupanodon pilchardus and C. pseudohispanicus: scale structure.


Description of scales of Amblygaster neopilchardus from Queensland.


Investigation on occurrence of Sardinia caerulea off coasts of Washington and Oregon shows that a big packing industry would not be practical.

Clupea pilchardus: description.


Clupea pilchardus: description; distribution.


Sardine canning in France and United States.


Season of appearance at different localities; Clupea sajax identical with European sardine; statistics; beginning of canning industry in California.


English methods of fishing and gear; methods of preserving—graphic description.


Sardine statistics.


Development and changes in sardine fishing boats.

**Conseil Permanent International pour l'Exploration de la Mer.** +. *Bulletin statistique des pêches maritimes.* Copenhague. (Annual.)

Statistics of the sardine fisheries of England in each issue starting with vol. 1 for 1903–1904, printed in 1906.


Description of sardine parasite (crustacean).

**Cornide, Joseph.** 1788. Ensayo de una historia de los peces y otras producciones marinas de la costa de Galicia, arreglado al sistema del caballero Cérllos Linneo. Madrid, p. 91–94.

Sardine fishery of Galicia.

**Cornish, Thomas.** 1870. Pilchards in Mount's bay on Christmas Day. *Zoologist,* 5, p. 2027.

Clupea pilchardus: late season for this locality.


Short note on above topic.

11–6/8 inch specimen; locality undetermined.

1880. Late stay of pilchards and early arrival of mackerel on the Cornish coast. Zoologist, 4, p. 112–113.

Unusually long pilchard season.


Record of pilchards being taken in full roe (July 19, 1881).


Popular account of pilchard fishery of Cornwall.


Habits.


Clupea pilchardus: compared with herring; spawning season; food; methods of fishing in Cornwall; methods of preservation; wages of fishermen; laws regulating fishery in Cornwall; extent and value of property employed in fishery; statistics, 1747 to 1826; conditions of fishery from 1815 to 1834, year by year.


Notes on Cornish pilchard fishery in 1728; ledger of Richard Trevill (1594) quoted at length to show how a merchant of Plymouth was attempting to take the trade out of the hands of the merchants of London.


Clupea pilchardus: colored plate; synonymy; distribution; description; habits; spawning; growth; food; fishing methods and gear of England; methods of preservation; use in heraldry.


Analysis of oils used in sardine canning.


Quotation from Carew (1811) on methods of fishing and preserving; statistics of Cornwall pilchard fishery from 1777–1837.


Condition of fishery; statistics.


Sardines abundant.


Description of eggs hatched under observation, possibly of pilchard.


Spawning of sardine; larvae described and figured.
Eggs, early growth and young stages described.

Growth of pilchard.

Growth of pilchard.

Summary of eight French papers on this subject, and observations on age and size of English pilchard.

Note on capture of a few year-old pilchards, April 23, 1892, all but one over 19 cm. long.

Reproduction.

First successful artificial fertilization; method of incubation described; description of eggs and larvae.

Clupea pilchardus: description; habitat; spawning; eggs and larvae described and figured; growth; maturity.

Description of sardine and other similar fishes; seasons and sizes of sardines in France and England; methods of fishing and preservation in both countries; summary of facts known about spawning; eggs and rate of growth.

Clupea pilchardus, C. sardina: described; second differs only in being smaller.

Alausa melanosticta, A. pilchardus: description, distribution of both; anatomy and figure of A. pilchardus; classification; fishing methods and gear in Mediterranean.

Sardine fishing methods of France.

2.4. D

Sardine statistics.

Methods of fishing and canning sardines in California; by-products.
Clupea pilchardus: time and place of spawning in the English Channel.

Sardine fishery of Tunis and of Algeria; statistics of Algerian fishery.

Pilchard fishing methods and gear.

Clupea pilchardus: description; spawning; figured.

Clupea pilchardus: synonymy; description; coloration; common names in England; habits; migrations; fishing methods; spawning: methods of preservation; oil; enemies and parasites; distribution.

Anatomy of digestive organs of Clupea pilchardus; food.

Clupea pilchardus: description; migrations; methods of fishing and gear; methods of curing; spawning; enemies and parasites; as food; as bait; habitat.

Description and figure of supposed hybrid.

Reasons for refusal to suppress the "filets tournants" in sardine fishery.

Clupea sajax: rather full synonymy.

Sardine statistics; fishing methods and gear.

Delidon, E. S. 1866. La pêche de la sardine. Soc. Linn. Maine-et-Loire, Ann., 8, p. 79–82.
French sardine fishing methods and gear.

Experiments with new kind of sardine bait.

Delsman, H. C. 1926. Fish eggs and larvae from the Java Sea. Treubia, 8, liv. 3–4, p. 220–221.
Description of sardine eggs and larvae.
"Bolinche," net used in Basque sardine fishery for night fishing.

Drying qualities of pilchard oil compared to other oils used in paint.

Mentions that the usually abundant sardines were not seen in 1725 on the coast of Brittany, probably due to the cold winter.

Poisoning from sardines.

Description of two cases of poisoning from sardines.

Clupea sardinia: description; spawning season and place; good account of fishing methods and gear; preservation methods; statistics.

Experiments on different methods of canning sardines.

Chemical composition of California sardines and sardine offal of different stages of decomposition (12–108 hours).

Chemical analysis of sardine, according to size, different schools and different degrees of sexual maturity; gonads analyzed separately.

1921.3. Fat content of the California sardine. Pacific Fish., 19, no. 8, p. 14.
Difference of fat content of four sizes of fish taken each month during 1919, three months of 1918 and six months of 1920; detailed careful analysis.

1921.4. Kippering sardines for canning. Pacific Fish., 19, no. 11, p. 12.
Experiment on smoking sardines for canning.

Chemical composition of sardine; literature cited.

Food value; iodine and calcium content.

Documents Relatifs à la Crise Sardinière, 1903–1907.
See France. Ministère de la Marine. 1908.

History of growth of sardine market in Orient.


Sardine fishery; statistics.


Clupea pilchardus: described; colored plate.


Sardine industry.


Account of case relative to reduction of sardines to fertilizer.


Methods of fishing and gear in England.


Series of articles on French sardine canning industry; habitat; migrations; food values; French fishing methods and gear; sale and distribution of fish as it is brought in; canning methods; by-products; foreign competition (labeling other fish as sardines).


Migrations of sardines (from Roule, 1929).


Habits of pilchards; preyed upon by "picked dogs" or Spinax.


Laws governing pilchard fishery of Cornwall; methods of capture; habits of pilchard.


Description of a form intermediate between sardine and herring.


Growth and food.


Chemical study of sardine male gonads.


Chemistry of sardine oil.

**Dyrenforth, Robert G.** 1887. Patents issued by the United States during the years 1882, 1883, and 1884, relating to fish and the methods, products, and applications of the fisheries. U. S. Comm. Fish., Rept. [for 1885] p. 1080.

Patent on a sardine can; description.

### 2.5. E


Sardine industry; statistics.


History and development of canning of small fishes (herring, menhaden, mackerel) as sardines; fishing methods and gear; statistics.


History of industry; fishing methods and gear; canning methods; international questions (Canada and United States); statistics.


Annual report giving sardine statistics.


Clupea pilchardus: eggs and larval stages described and figured.


Clupea pilchardus: bibliography of literature on eggs and larvae; description and figure of egg and four larval stages.


California sardine industry.


Clupea sagax: seasonal movements.

Statistics of the pilchard fishery.

1913. First report of the committee appointed by the president of the board of agriculture and fisheries to advise the board on questions relating to the elucidation through scientific research of problems affecting fisheries. London, p. 17.

Recommendations for pursuing pilchard investigation.


Statistics of the pilchard fishery.


Pilchard statistics.


Pilchard statistics.

Sea fisheries statistical tables. London. [Current.]

Annual reports containing pilchard statistics.


Clupanodon pseudohispanicus listed.


Clupanodon pseudohispanicus: description; distribution.


Sardinella sagax: description; distribution; synonymy.

2.6 F


Sardine fisheries, the most important in this region; methods of fishing and gear.


Sardine life habits to be the basis for making laws to protect them; important points discussed: spawning, migrations, food.


Report on conditions of French fishery.


Process of making artificial "rogue" (roe for bait).
Suggestions for improving French methods of fishing and gear.


Methods of fishing in France; very clear illustrations.


Eggs and larvae of sardine.


Development of sardine eggs.


Description of eggs, larvae; discussion of reasons and remedies for sardine failure in France.


Alosa sardina: larva described and figured.


Clupea pilchardus listed.


Relative merits of different methods of fishing in Mediterranean.


Clupea pilchardus listed.


Clupea pilchardus listed.


Growth.


Periods of growth; effect of temperature and reproduction on growth; relation between size and age; short bibliography.


Racial studies (vertebral counts) on 876 sardines taken from Cadiz to Plymouth; growth; differences in fat content at different times and localities; fluctuations in French fishery.
Clupea pilchardus: post-larval stages described and figured; mode of growth; spawning time and place all given for both Atlantic and Mediterranean sardine; fluctuations in both fisheries shown; discussion of four races of sardine; bibliography.

Fat content in relation to time of year.

Sardine fishery of Tunis; fishing methods; statistics.

Market for California sardines declining in China.

Description of new method and analytical study of costs.

Economic condition of fishermen; statistics of fishery.

Alosa sardina described.

Sardine statistics of Maine and California.

Sardine statistics; history of fishery and industry in California.

Sardine statistics, California.

Experiments showing vitamin A potency.

Sardine industry of Portugal; fishing methods and gear.

French sardine fishery; fishing methods and gear.
Fish Trades Gazette. 1912. More about the sardine. Norwegian view concerning the interesting little fish. Fish Trades Gaz., 30, no. 1513, May 18, p. 43–44.
Discussion and history of different fish canned as sardines in all countries; Norwegian process of packing described; history of litigation resulting from French interests demanding that only the pilchard be sold as sardine.

1930. British and U. S. sardine industries. Where California has the advantage. Fish Trades Gaz., 48, no. 4460, July 19, p. 27.
Attempt to show why English pilchard industry is not increasing and that of California is; reference to Scofield, W. L. (1930.4).

Fishing methods and gear; canning methods.

Unfavorable conditions in French sardine industry; many small fish (querille) caught with sardines; packers' and solderers' dispute.

English decision in controversy over canning sprats as "sardines."

Improvement of fishing methods and gear and handling of fish.

Development of industry in southern California; methods of canning.

Article from Bulletin Technique, Paris, (date not given); French government to furnish 150 fishing boats to fishermen; description of boats; one diagram of fish hold, and one of reverse gear.

Experimental canning factory at Eastport, Maine, for canning fish as sardines (small herring).

1925. Cannery to try bureau's process with sardines. Fish. Gaz., 42, no. 11, p. 45.
"Hot air" method of canning described (Maine).

Account of an enormous sardine catch at Monterey, California.

Sardine fishing methods in France; methods of canning; clear, concise description.

Definition of term "sardine."

Sardine fishery statistics of California.

Clupea pilchardus: description.


1916. Notes on some fishes from Chile. Copeia, no. 34, p. 64. Clupanodon sagax recorded from a collection of commercial fishes, Valparaiso.


France. office Scientifique et Technique des Pêches Maritimes. 1924+. Notes, no. 43, 46, 51, 52. Revue Trav., 1928+. Statistics of French sardine fishery beginning with 1924. [Revue des Travaux is continuation.]

Statistics of sardine fishery.


See Smitt, F. A., 1892.


Sardine fishing methods and gear.


French methods of canning.


Clupea pilchardus, rare fish off coast of Scotland.

2.7. G


Fishing methods and gear for sardines: “sardinal” and “lamparo”; laws regulating both; statistics; methods of salting.


Two cases of poisoning from canned sardines.


Internal parasite.


Questions regarding regulation of fishery: closed season and kinds of gear; statistics (1872–1887): men; boats; gear; amount and value of catch; imports; exports; Portuguese exports; conditions in French canning factories (number of men, women and children employed, wages); prices of fresh sardines, 1857–1887; prices of canned sardines, 1882–1887.


History of the commission of inquiry; summary of replies in answer to questionnaire; nets; recommendations for improving French fishery.
Description of copepod parasite.

Alausa pilchardus: synonymy; common names; season; parasites.

Attempts to account for phenomenon on basis of deflection of Gulf Stream.

Clupanodon caeruleus listed.
Clupanodon caeruleus listed.

Clupea sagax: description.
Clupea sagax: synonymy; description.

Genera Clupea and Meletta described.
Alausa californica: description.

Meletta caerulea: description; recorded from San Francisco. Alosa musica: description; recorded from Chile.
Alosa musica: described; from Calderon Bay, Chile.

Clupea sardina: description; distribution; food; migrations.

Use of electric light under water to keep fish from escaping from net.
1930.2. A discussion of the localities in which the California sardine (Sardina caerulea) was taken in the San Diego region, 1928–1929. In Fishing areas along the California coast for the sardine (Sardina caerulea). Calif. Div. Fish Game, Fish Bull., no. 25, p. 40–44.

Certain sizes of fish are found only in certain localities.


Length studies.


Clupea sajax (California sardine): distribution.


Clupea sajax (California sardine): distribution; habits.


Harengula sardina described.


Clupea pseudohispanica recorded.

**Goodrich, E. S.** 1922. On a new type of teleostean cartilaginous pectoral girdle found in young clupeids. Linnean Soc. London, Journ., zool., 34, p. 505–509, fig. 5.

Pectoral girdle of Clupea pilchardus.


Text and printed title in Japanese; no date of publication.


Causes and remedy for sardine failure.


Statistics of French sardine fishery.


Statistics; temperature and currents.


Sardine statistics.


Alosa sardina: size at different times of season; statistics of fishery.


Alosa sardina: sizes at different seasons.
Sardine fishery statistics.

Sardine fishery: statistics of different sizes of fish during year.

Statistics of fishery in France.

Sardine used as bait; fishing methods and gear; good description and a sketch of net; Alosa sardina: distribution; names of different kinds of gear used; statistics.

Sardine statistics.

Clupea sardina: time of appearance and spawning.

Process of canning sardines in Cornwall.

Differences distinguishing pilchard from herring.

Account of legal battle over reduction of sardines to fertilizer.

Organizing for betterment of product.

Clupanodon caeruleus: superficialis muscles highly developed.

Greffe, Pierre. 1930. La fraude des conserves de sardines. Indus. Franç. Cons., 17, no. 72, p. 120–128.
History of regulations and decisions as to labeling of sardines in Europe.

Abundance pointing to a lucrative industry.
1904.2. Those Pacific sardines. Pacific Fish., 2, no. 8, p. 15.
Discussion of merits of California pack of sardines as compared to Maine herring.

Résumé of events of 1903, 1904 and 1905; recommendations for helping situation.

Recommendation that sardine fishermen of Brittany go to Mediterranean African waters for winter fishing.

Canning methods for sprat sold as sardines.

Clupea pilchardus: important fishery; new factories started; methods and gear.

Clupea pilchardus fishery in Tunis.

Clupea senegalensis: three ages of fish erroneously thought three races; season.

Clupea pilchardus listed with French common names of sardine.

Review of knowledge of sardine migrations and spawning habits; outline of opinions of English and French research workers.

Alausa pilchardus: short synonomy; description.


Clupea pilchardus, C. sajax: distribution.

fish on land; statistics of canned sardines of France, Portugal and Spain; fishing methods and gear; fluctuations in abundance; recommendations for agreement between fishermen and cannery men.

2.8. H


Sardine industry: development since beginning in 1875; wages; description of canneries; making of tins; treatment of fish for canning; use of offal; legislation; statistics.


Clupea pilchardus: distribution; description of methods of fishing off coast of Cornwall; spawning seasons; food.


Fishing methods and gear and methods of canning in Maine.


Description of cooperative plan among sardine cannery workers.


New methods of canning introduced at Monterey (methods not described).

1929.2. Purse seiners invade field long held by lampara nets in Monterey fishery. Pacific Fish., 27, no. 12, p. 38, 42.

Change in sardine fishing gear, Monterey, California.


Collection of papers and documents relating to the history of commerce and industry in France; papers relating to sardine included in this bibliography under individual authors.


Meletta sardinites: description of fossils from Austria (horizon not given).


Collection of eggs of Clupea pilchardus; measurements of eggs.

Hemming, Doris. 1919. The sardine fisheries. Canadian Fish., 6, p. 394.

Description of slump in economic return of fisheries of Canada, 1919.


National Canners Association requirements for the packing of California sardines (given in detail).
Regulations for packing quoted and explained.

Inspection of sardine factories.

Food related to abundance of sardine; spawning.

Temperature of water and migrations of sardine; spawning season; fishery and industry of Spain; industry of Brittany; problems of expensive bait and antiquated fishing methods; statistics of imports and exports.

Number and kind of boats used in French fishery; statistics of catch brought in at different ports; production of factories; regulations governing fishery; suggestions for improving regulations.

Sardine investigations in southern California.

Fluctuations in abundance and other factors discussed in relation to sardine supply.

During seasons 1919–1922, data collected on 600 samples, containing 17,500 specimens which were measured, sexed, many weighed and observed for maturity and fatness; statistical studies made from data, and explained; represented in graphs; seasons; fishing areas.

Fishing methods and gear described in detail.

Chemical composition of sardine offal.

Study of a red stain in certain of French canned sardines due to an organism in alimentary tract of the fish.

scientific names of fishes labeled as sardines; scale readings and growth; migrations along European coast; comparison between Clupea harengus, C. sprattus, and C. pilchardus, with regard to life history and quality as food; prices; confusion concerning popular name; oil; machinery and trade-marks used; vindication of the name "Norwegian sardines"; derivation of word and different usages.


Litigation: English vs. Norwegians concerning labeling sprats as sardines.


Review of work on migrations; racial differences between Atlantic and Mediterranean forms; statistics of fishery in England, France and Portugal; conclusions based on study of statistics.


Clupea pilchardus: common names in the languages of Europe; distribution.

**Holder, Charles Frederick.** 1912. The fishes of the Pacific coast. New York, p. 99.

Clupanodon caeruleus: bait for game fish; said to spawn in Avalon Bay, Santa Catalina Island.


Spawning of pilchards; migrations; seasons for fishing along English coast; fishing methods and gear; methods of curing; statistics of yearly return of "sean-fishery," 1815–1873.


Methods and gear of the Cornish pilchard fishery.


Pilchard fishing methods and gear.


Results of collections and study of relative abundance of Clupea pilchardus eggs.


Clupea pilchardus: literature on reproduction and eggs; description of egg and larva.


Records of eggs of Clupea pilchardus.


Indian sardine: migrations; spawning; food. Clupea longiceps, C. lile, C. fimbriata, all mentioned; apparent inverse correlation between sardine and mackerel abundance; unusual mortality among sardines; statistics.

Well-rounded fishery investigation on Sardinella longiceps but over only short period; plankton investigation; abundance of mackerel inversely related to abundance of Sardinella. Conclusions: no races; mature at one year; length 15 cm.; go offshore to spawn; young migrate inshore at 4.5–7.5 cm.; high mortality after spawning; growth only 1 cm. in second year; come inshore to feed on phyto-plankton; season of abundance and rapid growth September to December; slow growth January to April; scales show rings; fatness dependent on oil secreting organisms in plankton; abundance of these organisms dependent on nitrogen in water and bright sunshine; internal parasites.


Sardine market in Chile; statistics of importations of sardines into Chile from United States and Spain (1927, 1928 and 1929).


Clupea pilchardus: description; migrations; spawning; food (list of diatoms); fishing methods and gear; statistics of amount and value of catch in Cornwall; curing methods; derivation of word pilchard.


Sardinella caerulea: food of the dogfish.


Sardinia caerulea: racial studies based on number of vertebrae.


Generic relationships; Sardinops given as correct generic name for California sardine.


Sardinia caerulea listed.


Fishing methods and gear; low wages of employees; machinery and supplies used; statistics of exports for 1929 and 1930.


Clupea sagax recorded.


Clupea sagax recorded.


Clupea sajax: description; distribution; abundance; figured.
2.9. I

Statistics of pilchard fishery in many of the numbers.

2.10. J

Sardine fishing methods and gear in France; methods of preservation; canning.

Spawning; food; development; growth; fishing methods and gear.

Amounts of raw and manufactured sardine products for each year from 1904 to 1913.

Tokyo, p. 16, 17; Dept. M, group 122, p. 1.
Statistics; spawning season; distribution.

Japan. Section of Statistics. Department of Agriculture and Forestry. 1922+. The agricultural and commercial statistics.

Clupea pilchardus: studies on otoliths in relation to age.

Clupea sajax: description; fauna of Peru.

U. S. Food Administrator's regulations in regard to sardine industry.

Bill adopted by California legislature regulating the amount of sardines that can be used in reduction plants.

Clupea pilchardus listed as rare.

Clupea sajax: description.
Further observations upon the fishes and fishing industries of Tasmania, together with a revised list of indigenous species. R. Soc. Tasmania, Pap. [for 1890] p. 37.

Clupea sagax recorded.


Hard fibroma (tumour) in a pilchard.


Clupanodon pilchardus, Sardinia caerulus: food value of different kinds of canned product; chemical analysis.


Hard fibroma (tumour) in a pilchard.


Clupea pseudohispanica: food of snappers.


Clupea sardina: description.


Clupea pseudohispanicus and C. sardina listed.


Clupea pseudohispanicus, C. sardina listed.


Clupea sajax, C. pseudohispanica, C. sardina listed; the last described, and color and synonymy given.


Statistics of sardine fishery in San Diego County (herring and sardine, 900 pounds in 1879).


Sardinella pilchardus mentioned as sardine of Europe; S. pseudohispanica of Cuba; S. caerulea of California; S. sajax of Chile; S. melanosticta of Japan.


Sardina pilchardus, S. caerulea: synonymy; nomenclature of genus.


Sardina should be Sardinia.


Sardina and Sardinia listed with authorities.


Sardinia and Sardinia listed.
Sardinia pilchardus mentioned as sardine of Europe; S. pseudohispanica of Cuba; S. caerulea of California; S. sajax of Chile; S. melanosticta of Japan.

Clupanodon caeruleus, C. pseudohispanicus: description; distribution; synonymy of each.

Clupea caeruleus, C. pseudohispanicus: listed; distribution.

Clupanodon caeruleus, C. pseudohispanicus: distribution and description of both; color of C. caeruleus.

Sardinia caerulea: distribution.

Clupea sagax: color; recorded from San Diego.

Clupea sajax recorded.

Clupea sajax: description; distribution; synonymy.

Clupea sagax: distribution in California.

Clupea pseudohispanicus: description.

Clupanodon to be substituted for Clupeonia and would include. C. pilchardus.

Description and coloration of Sardinella melanosticta with record stations.

Sardinia melanosticta: Japanese common names; markets where seen.

Clupea sajax records in California.
Jordan, David Starr, and Richardson, Robert Earl. 1909. A catalogue of the fishes of the island of Formosa, or Taiwan, based on the collections of Dr. Hans Sauter. Carnegie Mus., Mem., 4, no. 4, p. 166.

Sardinella toli listed; "sardines and pilchards should stand as Amblygaster Bleeker, a name earlier than Sardinia Poey."


Sardinella sirm: coloration.


Clupanodon melanostictus recorded from Tokyo.


Clupanodon caeruleus abundant in warmer part of season.


Sardinella stolifer a quite abundant at Mazatlan, Mexico.


Parasitic crustacean destructive to sardines.


Parasites.


Alosa sardina: migrations; spawning; illustrations of egg, larvae (3 stages) and adult; growth.


Experiments on refrigeration of sardines.


Clupea pilchardus: figured; short description; long list of common names, European and North African.


Clupea pilchardus: common names of southern Europe.

2.11. K


Sardinella melanosticta: description of egg; spawning season; time of day spawning occurs—sunset to sunrise.

Appeal to do away with duty on “sardines” (small herring) brought in from Canadian waters for canning.


1917. La pêche maritime. Son évolution en France et à l’étranger. Paris, p. 269–296. Importance of sardine industry in France; fishing methods and gear; industrial problems; a certain kind of bait detrimental to fish; statistics of French fishery; graph showing amounts and value, 1895–1913; controversy over use of name “sardine” in other countries for other kinds of fish; refrigeration.

**Kishinouye, Kamakichi.** 1907. Notes on the natural history of the sardine (Clupea melanosticta Schlegel). [Text in English.] Japan Imp. Fish. Bur., Journ., 14, no. 3, p. 71–105, pls. 13–21. Distribution; migrations; habits; food; spawning season; description of gonads at different stages of spawning; description of eggs and vertical distribution; description of early development from egg, larva to postlarval fish; rate of growth; sexual differences; fat content (not a chemical study); enemies; habits with regard to mode of capture; descriptions and figures of five other clupeids of Japan; cranial structure of each species described and figured.


**2.12. L**


Larousse Universel en deux volumes. 1923. Sardine. Paris, **2**, p. 885, 886. Set of illustrations representing the whole French industry from boats and nets to nailing up the boxes of cans; description of fish; distribution; short paragraph on the industry.


1888. Recherches sur les lieux de frayères et le mode de ponte de la sardine. Mémoire à monsieur le ministre de la marine et de colonies. Lorient,
Enormous abundance in 1888, effect of currents and eddies on sardine spawning; oily condition of sea seems to be attractive to sardines and this simulated by the "rogue" used by fishermen.

Substitution of pilchard oil for butter fat in calf feeding found to cause death in 15 days.

Recommendations for improving bad conditions in French sardine fishery.

History of canning in Europe; experiments to improve pack.

Arguments against use of "filets tournants" for capturing sardines.

Recommendation of refrigeration to help enlarge sardine market.

Food of 13 specimens of Clupea pilchardus.

Clupea pilchardus: food of 271 specimens.

Eggs; larvae; description of growth and development; migration of dorsal fin.

Food of Sardinia pilchardus.

Food of Moroccan sardine.

Sardine fishery in Brittany: history; bait, "rogue"; methods of manufacturing artificial "rogue"; economic and social conditions of fishermen.

Clupea pilchardus: synonymy; English and French common names; description; distribution.

Clupea pilchardus: French common names; description; distribution; French fishery.


Sardine races of the English Channel and the Atlantic; growth curves.


Review of work of office on races of sardine; “wild” sardine (out of season fishery); sexual dimorphism.


Clupea pilchardus listed from one station.


Clupea pilchardus: state of sexual maturity; age and growth; proportional measurements; spawning season and areas; migrations; bibliography.


Racial studies on sardines of Audierne, pilchards of Plymouth, and celans of Boulogne; length, sex and maturity; age and growth; measurements of different parts of body; review of knowledge of spawning, larvae and young; bibliography.


Clupea pilchardus: on coast of Brittany; racial studies based on body proportions, number of vertebrae, and measurements; sexual maturity; intestinal fat; age and growth studied by scale readings; methods of fishing and gear; length and age; migratory cycle; spawning; temperature affecting migrations.


Racial studies on European sardine; vertebral counts; length; weight; sexual maturity; fat content.


Sardine fishing methods and gear in France.


Study of economic conditions in France with recommendations for relieving wretched conditions.


Condition of fishery; statistics.
Methods of canning sardines in France; statistics of production.

Protest against labeling canned fish as “sardines,” which are really other kinds, a practice carried on by the United States and Norway principally.

Suggestions for improving state of sardine fishermen and of fishery.

Opposition of the French sardine factories against other countries labeling sprats, herring, etc., as sardines.

Condition of French sardine fishery.

In defense of French sardine canneries: their methods are for the good of the industry.

California sardine fishing methods and canning procedure; regulations governing canning.

Canning methods of Spain and Java.

Sardina caerulea: food and feeding habits; literature cited.

History of sardine canning in Nantes.

Clupea pilchardus: synonymy; description; food.

Description of albino sardine taken at Monterey, California, Sept. 18, 1928.

Sardine fishing methods and gear at Monterey, California.
1930.2. Fishing localities at Monterey from November, 1919, to March, 1929, for the California sardine (Sardina caerulea). In Fishing areas along the California coast for the sardine (Sardina caerulea). Calif. Div. Fish Game, Fish Bull., no. 25, p. 8–27.

Fishery shows signs of decline since boats have to go farther than formerly; statistics; maps and graphs.


Importance and history of sardine industry; comparison of catch of seven foreign countries with that of California.


Statistics of sardine fishery.


Clupea pilchardus: season of sexual maturity in gulf of Naples.


Clupea sajax: description.


Clupea sajax: compared with herring; abundance; distribution.


Clupea pilchardus: record of considerable quantities taken; observations on sexual maturity and size.


Poisoning from canned sardines.


Clupea sardina: morphology of the vertebral column.


Sardinia neopilchardus recorded.

Lowe, James ("The Chronicler"). 1864. A ramble in Finisterre; with notes on oyster-culture, marine fish-hatching, sardine fishing, etc., as practiced on the shores of the bay of Biscay. Field, London, 23, p. 76, 92.

Description of French sardine industry (catching and curing).
Clupea sardina: description; Portuguese common names.

Statistics of sardine fishery of Portugal.

Clupea pilchardus listed with localities.

Clupea pilchardus listed with lengths of specimens measured.

Lübbert, H. 1914. Was ist eine Sardine? Fischerbote, 6, no. 4, no. 6, p. 159–171, 265. Also in Der Fisch, herausgegeben von Dr. Hanns Lengerich. Lübeck, 1924, 2.
Kinds of fish canned as sardines.

Sardine fishery in France; French fishing methods and gear.

Clupea sagax recorded.

Sardine importations into Greece of ten countries, including the United States; statistics.

2.13, M

Migrations of sardines and reasons for their disappearance.

Clupea melanosticta: first noticed in 1864 in Hobson's Bay, Australia; enormous abundance in 1866; synonymy.

Clupea neopilchardus: recorded; distribution.

Sardinia neopilchardus: rather complete synonymy; description; coloration; distribution; reproduction; common names in Australia; seasonal appearance.

Sardinia neopilchardus, Australian pilchard: synonomy; habits.

History of canning small herring as sardines; methods of canning.

Machado, Antonio. 1857. Catálogo de los peces que habitan ó frequentan las costas de Cadiz y Huelva, con inclusión de los río Guadalquivir. Sevilla, p. 11.
Clupea sardina listed from coast of Cadiz.

Unsatisfactory season accounted for by poor means of distribution of product.

Clupea pilchardus: spawning seasons; review of discoveries in connection with spawning; habits; growth; larva figured.

Clupea sagax: description; migrations.

Clupea sara listed.

History of fishery in Gulf of Gascony; fishing methods and gear; fishing seasons; discussion of races; nature of ocean bottom, depth, temperature, density, winds; other meteorological conditions; reproduction; conservation; migrations; improvements for boats and fishing gear; economic conditions of fishermen and conditions of industry.

Madurec, Yves. 1912. La mer ne meurt pas, mais on la laisse mourir. Nantes, 7 pp.
Suggestion that sardines have not left the French coast but fishermen should get new methods.

Chemical analysis of sardine.

Clupea pilchardus: description; distribution.

Iodine content of sardine fish meal.

Sardine migrations.
Condition of sardine fishery in Brittany.

Statistics by months for 1887; food; size; spawning.
Spawning; synopsis of knowledge of life history.
Food; migrations; spawning; larvae; young.
Spawning.
Spawning and growth.
Sardine: statistics of fishery; sizes at different times of year; migrations; spawning; description of eggs; figures of egg and three stages after hatching; growth.
Succession of pelagic forms that furnish food to fishes, among them sardines.
Eggs and larvae: time for appearance.
Observations on sardine fishery for the year 1892.

Sardine fishery; fishing methods and gear.

Detailed description of skeleton of Clupea pilchardus.

Clupea pilchardus: numerous young of 25–35 mm. collected in Straits of Messina.

migrations described and given in map. *Clupea pseudohispanica* from Mexico, *C. caerulea* of California, *C. sagax* of Pacific and Indian oceans, *C. neopilchardus* of Australia and New Zealand, mentioned with localities.


Exportation of sardines from France forbidden.

Conflict with regard to French sardine fishery; general discussion of decline of franc and prices.

Sardinella melanosticta, S. immaculata, S. zunashi listed with Korean common names, and locality.

Methods of fishing in France; economic conditions of fishermen.

Condition of pilchard fishery.

Murphy, Robert Cushman. 1923. Fisheries resources in Peru. Sci. Mon., 16, p. 600.
Sardinella sagax: habits; fishery, Pisco Bay, Peru.

2.14. N

A legal decision concerning selling sprats labeled as sardines; Quibbon, 1912, quoted on use of term "sardine" in Europe.

Natvig, Jacob B. 1921. Norwegian view of salmon competition. Pacific Fish., 19, no. 5, p. 44. (This title should read "sardine" instead of "salmon.")
Protest against article in Pacific Fish., 1921, 19, no. 2, p. 54; labeling sprats as sardines.

Spawning areas; study of age and growth of young sardines by scale readings; study of gill rakers as racial character; food; literature cited.

Sardine oil found to be poorer in vitamin A than codliver, but equal in vitamin D.

Fluctuations in abundance.

Canning of sardines.

Proceedings of a meeting of the above-mentioned parties concerning French sardine industry.


Clupea pilchardus: description; methods of catch in England and Scandinavia.


Clupea pilchardus: fishing methods in Turkey; methods of preservation; regulations for fishery; statistics.


Possible relation of gear to decline in fishery; destruction of young sardines; statistics.


Condition of Portuguese fishery.


Sardine fishery in Mediterranean in middle ages.


Norwegian side to the sardine-sprat controversy.


Controversy over labeling sprats as sardines; review of Hjort, 1913.


Litigation over labeling sprats as sardines.


Usage of the word sardine in different countries of Europe.

2.15. O


Bacteriological study of canned sardines (east coast of U. S.).


(Apparently a review of a paper by Chabot-Karlen with the title as above but no date given.) Availability of sardine in commercial quantities in open ocean.

1894. Recherches documentaires sur les pêches maritimes françaises. Histoire de la pêche de la sardine en Vendée et sur les côtes les plus
History of French sardine fishery; laws; development of fishery; statistics; methods and gear; history of canning; supposed causes of disappearance of sardine; measures for protection.


Needs of the French sardine industry.


Different kinds of artificial bait for sardines.

Oeuvre. 1913. La crise sardinière. L'Oeuvre, Paris, suppl. to no. 1, Jan. 2.

Conditions of famine in Brittany as result of sardine crisis.


Clupea sajax: synonymy; description; coloration; season for appearance.


Amblygaster neopilchardus: synonymy; distribution.


Sex ratio (more females than males); maturity of ovary; length and weight of fish; chemical composition of bones, viscera, flesh, all fresh; chemical composition of salted sardine, sardine scrap, dried guano, and sardine scale.


Clupea pilchardus recorded.


Extracts from report presented to Chamber of Commerce of Lorient, Feb. 17, 1903, on sardine fishery.


History of sardine industry in France; statistics.


Development of canning factories in Brittany, their prosperity and reverses; laws.


History of French sardine industry; statistics.


History of competition of Portuguese sardines in market; statistics.

Foreign markets for French sardine; duties imposed and amounts exported.

2.16. P

Suitability of sardine for canning; reopening of a cannery at Port Townsend, Washington.

1904.1. Sardines, herring and smelts. Pacific Fish., 2, no. 4, p. 15.
English methods of canning sardines.

1904.2. Dry salted sardines. Pacific Fish., 2, no. 9, p. 10.
Experiments (not described) being made at Monterey, California.

Good description of canning methods at this period, in southern California.

1912.1. Laws about fish and sardine labels. Pacific Fish., 10, no. 5, p. 17.
Laws of United States (not given in detail).

Notes on English court decision in sardine labeling controversy.

A section in each issue during sardine season, taking up fishing and market conditions.

Account of European controversy over labeling brisling as sardines; decision of English court.

1916.2. Use of term sardine. Pacific Fish., 14, no. 11, p. 17.
Note on an order of Department of Trade and Customs of Australia, July 13, 1916, that "sardine" applies only to immature pilchard and to no other fish.

Sardine canning process, southern California.

Growth of this industry: use of surplus fish for fertilizer.

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

1917.4. Inspection for California sardine packers. Pacific Fish., 15, no. 11, p. 11.
Southern California sardine packers cooperate with National Canners Association for uniform inspection of canned fish.

1917.5. Government license regulations. Pacific Fish., 15, no. 11, p. 40.
Rules of U. S. Food Administration for canning sardines.

1918.1. An improved can-opener system. Pacific Fish., 16, no. 3, p. 46.
Improved sardine tin described and illustrated.

1918.2. New trade marks approved. Pacific Fish., 16, no. 4, p. 43.
List of canned sardine trade marks (Maine and California).

Regulations applying to sardine canning and reduction in California as set forth by Norman Hendrickson, director of investigations, National Canners Association.

1918.4. Greater depth for sardine nets. Pacific Fish., 16, no. 9, p. 52.
Improvements in sardine fishing methods at San Diego, California.
1918.5. Hearing on fishery investigations. Pacific Fish., 16, no. 12, p. 23–24.
Extracts from a report on U. S. government fishery investigations; sardine fishing methods and gear; canning methods.

Report of U. S. government on commercial stocks of canned sardines, July 1, 1918.

Food administration rules given for fishing and use of offal. (From Bull. no. 3 of U. S. Food Administration).

Description and figure of fish reduction machinery, used largely for sardines.

Need for improvement of pack to enter English market.

1919.4. Present status of sardine inspection service. Pacific Fish., 17, no. 5, p. 75.
Sardine canning inspection in southern California.

1919.5. Needs of the sardine industry. Pacific Fish., 17, no. 5, p. 76.
Industry of southern California.

California regulations for sardine canning.

Industrial conditions; list of sardine canners in California; statistics of pack beginning with 1912.

1921.1. Unfair competition in sardines. Pacific Fish., 19, no. 2, p. 54.
Quotation from San Diego Union, San Diego, California, with above title (labeling sprats as sardines and its bearing on tariff).

1921.2. Salachini industry at Monterey. Pacific Fish., 19, no. 2, p. 56.
Output of special pack of dry-salt pressed sardines.

New regulations passed by California state legislature.

Description and illustrations of sardine cannery at Long Beach, California.

Question—what proportion of catch shall be turned into fertilizer?

1924.2. Purifying sardine fryer oil. Pacific Fish., 22, no. 4, p. 15.
Canning practices, southern California.

General discussion of proposal: abundance; depletion; possibility of developing other uses for pilchards.

Sardine reduction decision.

Regulations regarding number of cases to be packed from every ton of fish (remainder reduced to fertilizer).

1925.3. California sardine inspection. Pacific Fish., 23, no. 12, p. 60.
Regulations adopted for inspection of pack in California.

1926.1. Improvement of methods in the California sardine canneries. Pacific Fish., 24, no. 3, p. 12, 32.
Description of inspection regulations and improved machinery.
1926.2. Remarkable growth of Vancouver Island pilchard industry. Pacific Fish., 24, no. 8, p. 7–10. Manufacture of oil and meal; fishing methods and gear.

1926.3. New pilchard reduction plants elaborately equipped. Pacific Fish., 24, no. 8, p. 11–12. Description of equipment of Vancouver Island pilchard reduction plant.


1928.1. Sardine canners adopt new methods. Pacific Fish., 26, no. 1, p. 34. New canning methods and machinery described.

1928.2. New can draining machinery. Pacific Fish., 26, no. 8, p. 32. Description and figure of new device for sardine canning.


1929.1. New decisions on sardine reduction. Pacific Fish., 27, no. 3, p. 29. Litigation in California over amount of sardines permitted for reduction to fertilizer.

1929.2. California sardine reduction controversy. Pacific Fish., 27, no. 4, p. 46. Litigation in California over amount of sardines permitted for reduction to fertilizer.

1929.3. California sardine legislation. Pacific Fish., 27, no. 6, p. 34; no. 7, p. 42. Litigation in California over amount of sardines permitted for reduction to fertilizer.

1929.4. Sardine spawning area located. Pacific Fish., 27, no. 8, p. 40. Discovery by E. C. Scofield of sardine eggs and larvae off Point Vicente, southern California.

1929.5. Purse seine displaces lamparas. Pacific Fish., 27, no. 8, p. 41–42. Change in sardine fishing gear at Monterey, California.


Sardine industry in California.

Increase of world markets; methods and gear; canning methods; standardizing pack; dietetic importance (food and iodine value); statistics of exports from United States, 1925–1928.

New plans for cooperation among canners.

Method of sardine canning described.

1930.3. Two new sardine baking methods. Pacific Fish., 28, no. 11, p. 23–24.
New methods of canning used at Monterey, California, described.

Statistics of pack, 1912–1929; changes and improvements in industry.

Sardine canning investigations.

Statistics: amounts and value.

Market conditions for California sardines.

Condition of industry.

Statistics of sardine by-products in California and British Columbia.

1931.3. Sardine pack is estimated about half that of preceding season. Pacific Fish., 29, no. 4, p. 36.
Condition of California sardine industry.

Sardines, anchovetas and menhaden taken in Magdalena Bay, Lower California, in immense quantities as bait.

1931.5. Herring and pilchard oil sold at low price; early production proves heavy. Pacific Fish., 29, no. 9, p. 83.
Oil market.

Pallas, Peter Simon. 1831. Zoographia Rosso—Asiatica, sistens omnium animalium in extenso Imperio Rossico et adjacentibus maribus . . . Pet-

ropoli, 3, p. 204–208.
Clupea pilchardus described.

Sardina, common name for Clupea sprattus and C. sardina.

Clupea pilchardus: synonymy; common names in Spain.
Clupea pilchardus: description; coloration; habits; migrations.

Criticism of Lewis, 1929.

Clupea pilchardus recorded.

Description of fossils of Clupea sardinites from Oligocene of Rumania.

Sterilization of sardine cans.

"Bolinche" net authorized to operate in Bayonne district; legal regulations given.

Salt tax and the sardine fishermen of Moroccan coast.

Statistics of sardine importations of French East Africa.

Portuguese sardine net described.

A crab in large numbers spoiling fishing in bay of Concarneau.

Appeal to reduce high price of sardine by use of large nets.

Regulations for use of “filet trainant” on Algerian coast.

Justification of duty on salt to be used for curing sardines on board ship (France).

Ban lifted on certain kinds of nets.
Cost of equipping a Brittany sardine boat.

Locating sardines by dirigible, west coast of France.

Greater use of net, "filet tournant," in Brittany.

Dirigible used to survey sardine fishery, west coast of France.

Conflict regarding French sardine fishery; quarrel between fishermen, buyers and canners.

Settlement of conflict between sardine fishermen and buyers.

Artificial roe for sardine bait.

Sardine statistics in nearly every issue beginning with 1928.

1928.2. Les possibilitiés d'installation d'usines de conserves à Collioure, port sardinier. Pêch. Marit., 11, no. 512, p. 177.
Possibilities for installing sardine canneries at Collioure.

California process used for canning Maine "sardines."

Results of agreement between fishermen and canners at Sables-d'Olonne.

Sardine fishing methods and gear in Portugal; good explanation.

Experiments in refrigeration of sardines.

Improvements in marketing methods increase sale of sardines in Paris.

French fishermen's side of sardine question; abundance causing low price and misery among fisher folk.

Sardine statistics of Morocco.

Sardine statistics of Algeria.

Description of freezing experiments on sardines by the Ottesen process.

Sardine fisheries.
Fisheries of Cornwall; methods of fishing and preservation of pilchards.

Pilchard; description; season in England; methods of fishing; statistics.

Chemical composition; table of results in English; text in Russian.

Recommendations for improvement of French sardine fishery.

Nutritive value of sardine; chemical composition.


Sardine canning procedure in France, described and illustrated; utilization of by-products; costs of canning; other methods of preservation described.

Discussion of sardine failure: credit for fishermen; new organization; price of bait; prohibiting use of seine.

Poisoning caused by sardine.

Regulations governing the French sardine fishery.

Clupea sardina recorded.

State of sardine industry in United States.

Regulations for the prices paid fishermen for sardines.

Sardinia neopilchardus recorded.
Sardina neopilchardus: large school in harbor; figure of fish.

Sardinia neopilchardus; synonymy cited with original authors.

Habitat; methods of smoking; fishing methods; spawning season; distribution.

Sardina neopilchardus recorded.

Account of series of fires and wrecks of sardine fishing boats at Monterey, California.

Sardine fishing methods and gear.

Comparison of purse seine and lampara gear; former taking place of latter.

Poey y Aloy, Felipe. 1851. Memorias sobre la historia natural de la isla de Cuba, acompañadas de sumarios latinos y extractos en francés.
Habana, 1851–1858, 2, p. 311–312.
Sardinia pseudohispanica: description.

Harengula sardina (sardine of Cuba): description. Sardinia pseudohispanica listed.

Sardinia pseudohispanica listed.

Sardinia pseudohispanica listed.

Sardine fishing methods and gear in France.

Madrid, 1923, p. 373, 374, 375, 384, 385.
Sardine statistics.

Annual report containing sardine statistics.

Review of bait situation in France; artificial "roe" or bait.


Methods, gear and industry in both Spain and Portugal.


Plea for use of seine in sardine fishery.


Outline of what this laboratory has done and expects to do concerning sardine question.


(1) Scientific aspect: reasons for variations in fishery; possibility of depletion by overfishing. (2) Economic aspect: competition from other countries; condition of fishermen; laws regulating fishery; discussion of advantages and bad effects of use of "le filet Guezennec" (purse seine?).


Description of sardine season in 1887; size and abundance.


Popular description of sardine fishery and industry of France; discussion of history; regulations of fishery and reasons for latter.


Measurements at different seasons; sexual maturity at different sizes; correlation of plankton and meteorologic conditions with presence of sardine; study of eggs (poor drawing); growth (curve given).


Discussion of sizes and possibility of using figures from commercial catch.


Sardine season, Brittany, 1888; uniform size of fish.


Description of a graph showing the size of sardines for each day of the 1881 season, but graph not given.


Description of sardine egg; spawning; age at sexual maturity.


Growth of Atlantic sardine.


Size of fish and sexual maturity shown in graphs for different localities for whole season; statistical tables.


Migrations; growth.

Statistical tables for different ports showing size; eggs and spawning.

Condition of fishery in 1889–1890: sizes caught at different stations; sexual maturity; migrations; possibility of depletion by overfishing.

Comparison of Atlantic with Mediterranean form.

Unusual variety in size of sardines of 1890 season; discussion of sardine eggs.

Summary of report of Laboratoire de Concarneau for 1888; size of sardines and sexual maturity at different seasons.

Food.

Clupea pilchardus: eggs and larvae described and figured.

2.17. Q

Statistics of European imports and exports of sardines.

1927. The Californian industry. Fish Trades Gaz., 45, no. 2316, p. 25.
Sardine industry in California.

2.18. R

Fishery at Sables-d'Olonne.

Sardine statistics.

Statistics of fishery for California sardine (Sardinia caerulea) and for Maine "sardine" (Clupea harengus).

Review of development of California sardine industry; statistics.

Statistics of sardine—Maine and California.
Sardines: statistics of importations into Mexico.


**Ravertet-Wattel, Casimir.** 1909. Atlas de poche des poissons de mer de la France et de la Belgique. In Bibliothèque de poche du naturaliste, 17, p. 68, 153–160, 177–182. *Alosa sarda*: figured; described; food; habits; larvae figured and described; reasons for variable fishery: temperature, food and currents; fishery in Europe (especially France); fishing methods and gear in France; canning methods.


1916.2. Larval and post-larval fishes. British Antarctic (Terra Nova) Expedition, 1910, zool., 1, no. 4, p. 136, pl. 5, figs. 3, 4. *Sardina neopilchardus* from New Zealand: larvae described and figured.

Clupanodon thirssa, C. punctatus: synonymy; description; distribution.


"Cerco real," a sardine net used off coast of Sardinia and Galicia, described and illustrated.


Information regarding the sardine fishery in reference to protective legislation.


In each month’s issue from 1893–1902, a section on statistics of sardine fishery, France.


Condition of sardine fishery in Spain.


Food.


Clupea caerulea-vittata: description; coloration.


Description of crustacean parasite of sardine.


Clupea pilchardus: anatomy of air-bladder and ear.


Clupea sardine: description.


Clupanodon sardina, *C. pilchardus*: description.


Catch statistics; number of fish per boat; price per 1000 fish.


Catch statistics; number of boats; catch of fish per boat; price; locality.
Roberts, William. 1871. Quantities of pilchards exported from Cornwall, and prices at which they were sold; from 1815 to 1871. R. Instn. Cornwall, Journ., 1871–73, 4, p. 159–161.

Statistical tables showing the above.


1893.3. La crise sardinière et les sciences biologiques maritimes. Revue Gén. Sci., 4, p. 308–313. Outline of facts of sardine failure and periodic disappearance of sardine; work (in Europe and America) being done to discover causes; outline of facts and theories of reproduction.


1558. L’histoire entière des poissons. Lion, p. 181–182. Sardine and celerin both described and figured.
Economic conditions; cost of gear and wages of fishermen; organization of a fishing crew; living and social conditions of fishermen; suggestions for improving conditions; ways of protecting fisheries and increasing them; theories of sardine migrations, habitat, food, reproduction, hydrographic conditions (currents, winds and electricity); suggestions for improving gear, and increase in profit from fishery; bibliography.

Clupanodon neopilchardus: description; color; distribution; habits; food; methods of capture.

Plans for organization of sardine fishermen: buying of gear, selling of fish; insurance protection against poor years.

Alosa sardina: adult, eggs and larvae described and figured; distribution; habitat; fishing seasons (Europe); food; spawning season; incubation.

Alausa pilchardus listed.

Sardina pilchardus: time of fishing season in Spain and France; optimum temperature 13°–23° C.; growth; migrations.

Young sardines collected from two stations.

Pilchard nets; statistics of catch.

Sardina pilchardus: vertical distribution of young fish.

Clupea pilchardus: seasonal variations in abundance, 1924–1926.

Fishery of Sicily; fishing methods and gear; illustrations; probable causes of abundance of sardine; eggs; sexual maturity; statistics and value of fishery.
2.19. S


Work done on "sardines" (small herrings) at Atlantic Biological Station, St. Andrews, N. B.


Study of bacteriology of spoilage in canned sardines (small herrings, east coast of Canada).


Fishery in Brittany; manufacture of products; history of sardine failure and results of inquiry into causes; recommendations for remedying conditions; statistics of French and English fisheries; laws regulating the fishery; arbitration concerning the sardine failure.


Disease of fishermen resulting from eating sardines.


Sardine fishing methods and gear; regulations.

Sanz, Luis Alaejos. See Alaejos Sanz, Luis.


Alosa sardina: description; distribution; habits; migrations; food; French, Spanish and English fishing methods and gear described in detail; French methods of preservation and canning.


Food of sardine.


Food of Alosa sardina.


Measurements, food and parasites of a sardine found on the coast of Boulogne in December.


Alosa sardina: studies on sexual maturity.

Schonevelde, Stephanus A. 1624. Ichthyologia et nomenclaturae animalium marinorum, fluviatilium, lacustrium, quae in florentissimis ducatibus Slesvici et Holsteiniae et Emporio Hamburgo occurrunt trivialis; ac plerorumque hactenus desideratorum imagines, breves descriptions et explicationes. Hamburgo, p. 66.

Brief mention of sardine as being caught along coast of Schleswig-Holstein.


Description of methods of investigation; eggs and larave described and figured; complete series up to 3.5 mm. collected.
Possibility of increasing sardine industry in California.

Growth of sardine industry in California.

Suggested use of aeroplane to locate schools of sardines.

15,630,000 pounds of sardines used in manufacture of fish meal at San Pedro during January–April, 1919.

1919.3. Commercial fishery notes. Calif. Fish Game, 5, no. 4, p. 197, 198.
Sardine season at Monterey; dry salting of sardines.

Statistics of fisheries; methods of gathering statistics; program of sardine investigations.

Very large quantities of sardines used as fertilizer, perhaps endangering supply; market conditions.

Note on ruling of Chilean government raising duty on sardines from 30 cents per kilo to $1.20.

Description of sardine investigation on age and rate of growth; litigation and regulations in regard to reduction to fertilizer.

1923.2. Who are the conservationists. The lampara net. Calif. Fish Game, 9, no. 4, p. 170.
Legislation in regard to purse seine and lampara net.

1924.1. The lampara net. Calif. Fish Game, 10, no. 2, p. 66–70.
Methods of using this net in catching sardines; case for and against it as a destroyer of other fish with insufficient evidence to condemn it.

1924.2. The purse seine. Calif. Fish Game, 10, no. 4, p. 182–186.
Description and diagram of this net and its use in sardine fishery.

Increase of sardine industry; regulations in regard to reduction of fish to fertilizer.

1925. Sardine fishery of India. Sardine possibilities in New South Wales. Sardines and herring may be used for fertilizer in British Columbia.
Calif. Fish Game, 11, no. 2, p. 84–86, 87.
Fishing methods and methods of preservation in India; abundance of Sardina neopilchardus in New South Wales; fish may be caught in British Columbia to convert into fertilizer.

Litigation over reduction of sardines to fertilizer; growth of industry; statistics.

Summary of catch figures and organization of canners; cannery inspection; cannery research; litigation in connection with floating reduction plants which operate outside of three-mile limit to evade state laws.
Increasing scarcity of sardine supply.

1928.3. Why California sardines are caught at night rather than by day. Calif. Fish Game, 14, no. 3, p. 250.
Fishing methods in California.

Fishery conditions.

Conditions in California industry.

Suction, using seawater, speeds up process, besides scaling fish.

Process of fish reduction; machinery described; method of recovering oil and making meal.

Fishery and market conditions; terms of agreement drawn up between canners and fishermen.

1925.1. Average length of Monterey sardines. Calif. Fish Game, 11, p. 84.
Size variations in Monterey sardines.

Statistics of sardine fishery.

Description of purse seine and its use; round haul or lampara described.

Fishing seasons from November, 1919, to March, 1923, studied; progression of size of fish discussed and represented in graphs; sexual dimorphism.

Sardine investigation being continued.

Comparison of size of catch at two ports; statistics.

Graph showing catches for three California districts, 1915–1926; importance of industry discussed.

1929.1. Opening date for the 1928–1929 sardine season. Calif. Fish Game, 15, no. 1, p. 72. Also in West Coast Fish., 1929, 1, no. 11–12, p. 32.
Cannery operations agreed upon to start August 6 at Monterey and October 6 at San Pedro for economy, not conservation.

Sardine canning cause of enormous jump in amount caught.

Enormous importance of sardines as compared with all other fish; statistics.

Fishery of California; statistics.
Scarcity affecting tuna fishery (small sardines used as bait); may indicate depletion of these sizes.


Sardine statistics.

Enormous importance of sardines as compared with all other fish; statistics.

Sardine fishing industry; fishing methods and gear.

Percentage of sardine poundage for 1929 used in canneries.

Sardine investigation in France.

Clupea pilchardus: otoliths described and figured.

Clupea pilchardus: listed; synonymy; distribution.

Suggestions for methods of sardine canning; list of clupeoid fishes found in Philippines, including Sardinella melanosticta.

Suggestions for starting sardine industry.

Clupea pilchardus given in systematic account.

History of sardine fishery in Brittany in eighteenth century, from economic standpoint.

History of fishery in Brittany, taken from certain documents.

History of sardine industry in Brittany; statistics; laws regulating fishery; fishing methods and gear.


Causes of the failure; description of Clupea pilchardus; sardine in antiquity (Apicius' recipes); methods and gear; use of cod roe for bait; process of making artificial "rogue"; social and economic conditions of fishermen; methods of canning; economic conditions of cannery workers; the misery of 1887—economic and social conditions; suggestions for helping conditions; statutes of a society of credit for sea fishermen.


Causes of the failure of sardine fishery; suggestions for improvement of boats and gear.


Chemistry of muscle of Clupea melanosticta.


Clupea pilchardus: season in Libya, North Africa.


Record of what has been done in sardine investigation in California.


Sardine canning; statistics of California industry.


Comparison of systems of sampling to get vital statistics; weightlength studies.


Canning sardines in Maine and California.


Sardines: statistics, east and west coasts of United States.


Sardine statistics.


Sardine statistics.


Clupea pilchardus: synonymy; description; compared with herring; season of appearance in British waters.
Clupex sagax: description; distribution; methods of fishing in Cornwall and Spain; methods of preservation in Cornwall and France.

Sardine fishing methods and gear.

Clupea sardina: French methods of fishing and canning; quantities landed at different French ports.

Sardine fishing methods and gear; question of destructiveness of this net. (For review, see Thompson, W. F., and Higgins, 1923.)

Sardine canning at San Francisco and San Pedro; fishing methods.

Sardine canning statistics; record of sardine cannery established at San Pedro in 1893.

Clupanodon pseudohispanicus; notes on abundance and time of appearance.

Fishing methods and gear; spawning season; statistics; canning methods; wages of cannery employees; methods of preparation of American bait for French sardine fisheries.

Sardina pseudohispanicus recorded from Woods Hole.

1904. Brittany, the land of the sardine. St. Nicholas Mag., 31, no. 11, p. 963–968, figs.
Fishing methods and gear; methods of canning.

1905. The sardine. Pacific Fish., 3, no. 1, p. 12, 15.
European sardine: description; distribution; fluctuations in fishery; different sizes taken off English coast and in Mediterranean.

Popular article describing sardine fishing methods, complicated division of earnings of fishermen; methods of canning.

Methods of catching Cornish pilchards.

Canning of sardines in Cornwall and France.


Review of work of Pouchet and Marion on sardine as to identity of pilchard and sardine; spawning habits; migrations; fishing methods and gear in Spain; methods of preservation.


Clupea pilchardus: synonymy; description; figured; distribution; food; migrations; spawning; enemies.


Review of California Fish and Game, 1921, 7, no. 4, sardine number.


Fishing and preserving methods in France.


Sardinella melanosticta: synonymy; description.


Sardine statistics of Spain for 1915.


Sardine fishery on coast of Portugal.


Short description of Norwegian methods of canning sprats as sardines.


Controversy over true and false sardines.


Sardine industry in France.

1926.2. La importación y exportación de conservas de sardinas en Francia. Bol. Pescas, 11, no. 123, p. 316.

Importations and exportations of sardines in France.


Description and illustrations of California sardine industry.


Statistics.


Sardine statistics of Spain.
Clupea pilchardus: methods of canning in France, Spain, Portugal; Norwegian methods of canning sprats as sardines.

Clupeonodos caeruleus listed from Puget Sound.
Sardinella sardina described.
Sardinia caerulea: description; methods of canning in California.
Sardinia caerulea: anatomy of skull.

Sardinella caerulea: description; distribution.

Clupeonodos neopilchardus: abundance in Australian waters; distribution.
1908. The edible fishes of New South Wales. Sydney, p. 25–26, pl. 4.
Clupeonodos neopilchardus: coloration; abundance in Australian waters.

Alausa pilchardus: distribution.
Clupea neopilchardus: description.
Clupea sajaz listed from Chile.

Clupea pilchardus: detailed discussion of synonymy, classification, morphology, and anatomy, including otoliths and scales (both figured); parasites (good discussion), 16 listed; food; spawning; eggs and larvae described and figured; history of sardine industry in Europe.

Salted, pickled and canned sardines.

Scale readings for age.

Clupanodon pseudohispanicus: parasites; food.


Food and feeding habits.

1914. The scientific and economic aspects of the Cornish pilchard fishery. II. The plankton of the inshore waters in 1913 considered in relation to the fishery. Mera Publications, St. Albans, no. 2, 32 pp.

Plankton studied in relation to pilchard fishery.


2.20. T


Sardine canning in California; statistics of Maine and California.


Chemical composition of California and Maine sardines.

Temminck, Coenraad Jacob, and Schlegel, Herman. 1850. Pisces. In Fauna Japonica, sive descriptio animalium quae in itinere per Japonicam suscepio annis 1823–1830 collegit, etc., by Ph. Fr. von Siebold. Lugduni Batavorum, p. 237, pl. 107, fig. 3.

Clupea melanosticta: description; colored plate.


Comparison of value of catch of sardines.


Clupea sagax: season of appearance; abundance.
Terry, John B. 1929. Monterey retains distinction of being world's leading sardine port. Calif. Fish., 1, no. 6, p. 7–8.
Sardine season described; statistics, 1920–1928.

Two species of Coccidium parasitic on sardine.

Parasites.

Nutritional value of sardines; chemical analysis.

Review of Calif. Fish Game Comm., Fish Bull., 1926, no. 11.

Clupea pilchardus: localities noted.

Thompson, William Francis. 1919. Notes from the state fisheries laboratory. Calif. Fish Game, 5, no. 3, p. 159.
Investigations on the breeding season of the sardine of southern California.

1920.1. The proposed investigation of the sardine. Calif. Fish Game, 6, no. 1, p. 10–12.
Outline of questions to be answered in investigation of California sardine.

1920.2. Progress of the sardine work. Calif. Fish Game, 6, no. 2, p. 83.
Sardine investigations in southern California.

Present investigations on California sardine with purpose of predicting future of fishery.

1921.2. Notes from the state fisheries laboratory. Calif. Fish Game, 7, no. 1, p. 59–60.
Sardine season; conferences on sardine work in southern California.

1921.3. Quarter-oils or half-pound ovals. Calif. Fish Game, 7, no. 2, p. 106–110.
Discussion of effect of year classes, migrations, and physical conditions on size of fish in commercial catch.

Criticim of theories relating to abundance of sardines.

Sardina caerulea of California, S. pilchardus pilchardus of Atlantic, S. pilchardus sardina of Mediterranean, S. sajax of Peru, S. melanosticta of Japan, S. neopilchardus of Australia, S. ocellata of Cape of Good Hope, are the true sardines of the world.

History of fishing and canning methods; by-products.

Sardine fishery of California from 1879 to 1920 (number of pounds only).
Reduction of sardines to fertilizer; discussion of question as a matter of conservation.

Program and methods of sardine investigation.

Sardina caerulea compared with Clupea pilchardus in color, scales (figured), gill rakers, body and head proportions, vertebral counts, gill raker counts, local races; distribution of sardines on American Pacific coast, according to amount used; statistics; weight studies; season of fishery; amounts of pack; fishing methods and gear; causes of fluctuations in catch of European sardine; French fishing methods and gear; migrations related to food; effect of temperature on spawning; detailed discussion relating to analysis of the commercial catch; description of available material and method of sampling; age analysis; outline of methods of investigation on length, sex and sexual maturity and other data mentioned; literature cited.

Critical study of statistical methods used; length studies; growth rate.


Thompson, William Francis, and Higgins, Elmer. 1920. Notes from the state fisheries laboratory. Calif. Fish Game, 6, no. 1. p. 32.
Scientific research started on California sardine.

Review of Skogsberg, T., 1925; sardine fishing methods and gear; question of destructiveness of this net.

Clupea sajasa found in enormous quantities in New Zealand.

Clupea sajasa: abundance suggesting possibility of industry.

Theories to account for disappearance of sardines; discussion of bearing of oceanography and international cooperation on problem.

Description of sardine canning methods of Maine, California, Norway and France; chemistry of fish; preparation of herring as Russian sardines; methods of manufacture of oil and meal; characteristics of oil, American and European; chemical composition of scrap; statistics of canned fish (east and west coast of United States).

Alosa sardina: chemistry.
History of sardine fishery of Brittany in the 1700's and 1800's.

Sardine heads used in Japan to cast out demons.

Turton, William. 1807. The British fauna, containing a compendium of the zoology of the British islands; arranged according to the Linnean system. Swansea & London, p. 106.
Clupea pilchardus: coloration; description.

2.21. U

Sardina caeruleus: synonymy.

Conditions of industry.

Experiments in sardine canning methods at San Pedro, California.

Experiments in canning methods at San Pedro, California.

Act to regulate the quality of sardine pack.

In nearly every number beginning with 1925 are notes on sardine fisheries, industry and market conditions of the world.

Statistics and condition of industry.

Recipes for preparing canned sardines.

Sardina caerulea: California methods and amount of production; history of industry; foreign production; imports, exports of United States; prices of all countries compared; history of tariff.

Statistics of sardin catch in California, 1929, according to alien-owned and citizen-owned vessels.
2.22. V

Economic conditions of Spanish sardine industry affecting French crisis; Spanish regulations for the sale, preparation and packing of sardines.

Protest against labeling sprats as sardines; amount and value of sardines landed (March, 1913) at the Spanish port of Vigo.

Statistics of exportations from Vigo, Spain; conditions in Spanish sardine industry.

Alosa pilchardus: habitat; temperature affecting migrations; food; reproduction; causes of disappearance.

Vauvert, Maxime. 1870. La pêche de la sardine. La Monde Illustré, Paris, p. 374.
French sardine fishery (short article).

Experiments in refrigeration of sardines.

Sardine fishery of Estonia; amounts canned.

History of sardine fishery, Concarneau, 1722–1730.

Clupea pilchardus listed.

Iodine content of sardine.

Meletta sardinites figured; Meletta genus described; horizons and localities given.

Meletta sardinites, var. heterostoma: description of fossils.
2.23. W


Experiments and details of chemical changes in canned sardines.


Chemistry of California and Maine sardines.


Description of case of poisoning from sardines.


Decision with regard to canning of sardines (amount allowed for reduction to fertilizer); statistics.


Record of discovery in southern California waters by E. C. Scofield. (See Scofield, E. C., and Lindner, M. J., 1930.)

1929.3. Oceanographers seek facts about the sardine. Life history of the pilchard being worked on; scientists find eggs. West Coast Fish., Aug., p. 13, 18.

History of research on the California sardine; finding of eggs.


California statistics taken from California Bureau of Commercial Fisheries records.


Sardine season in California.


Condition of fishery.

1929.7. Is the map of the sardine packing world due for a change? West Coast Fish., Oct., p. 14–16.

Starting of cannery in Santa Barbara in order to be nearer sardine fishing grounds.

1929.8. Monterey sardine products co. opens $200,000 plant. West Coast Fish., Oct., p. 29–33.

Description and illustrations of equipment of new plant at Monterey, California.

1929.9. Sardine exports. Movement of fish in and out of Los Angeles shown. West Coast Fish., Nov., p. 44.


1929.10. Sardine chiller installed by Van Camp company. West Coast Fish., Dec., p. 18.

Description of apparatus for chilling sardines.

1930.1. Sardine packers of California. A guide to the canned fish trade giving location of plants, officers, principal brands and fish packed. West Coast Fish., New Year's No., p. 41.

Directory.

1930.2. Canning of the true sardine in California. West Coast Fish., New Year's No., p. 42–46.

Fishing methods and gear; history of industry.

1930.3. New sardine exhausting. West Coast Fish., New Year's No., p. 73.

Tabulation of costs of "drying and frying" and "raw pack."
1930.4. The California state fisheries laboratory. West Coast Fish., New Year's No., p. 93, 94. Sardine investigations carried out, and in progress.

1930.5. Sardines. Their range and season in domestic and contiguous waters. West Coast Fish., Feb., p. 8–12, FFV, sec. 17. Distribution; season; fishing methods and gear; fishing areas; relation of fatness to temperature of water.


1930.7. The sardine is acquitted. West Coast Fish., May, p. 9, 17. California sardine in Cuban and Belgian markets; tariff rates of two latter countries.

1930.8. Sardine canners association to expand operations. West Coast Fish., May, p. 11. Enlargement of California organization to include all canners.

1930.9. California sardines. West Coast Fish., July, p. 70. In each issue during the season, starting with this number, is a page devoted to cannery, markets and fishing conditions.

1931.1. A successful sardine light buoy. West Coast Fish., March, p. 29. Description of light buoy for sardine nets.


Description and use of pilchard seine (England).

Pilchard: distribution; spawning; food; fishing methods and gear; in heraldry; methods of preservation; laws regulating fishery; statistics.

Statistics of sardine fishery in California, including amounts landed according to gear used.

Statistics of California.

Sardine canning industry; statistics of California.

Pilchard: description; anatomy; method of fishing in England; small pilchard (the fish of the Mediterranean) described and figured.

Regulations governing labeling.

Clupea pilchardus: synonymy; description.

Clupea sardinites: synonymy; description of fossils from Lower Oligocene, Croatia.

Pilchard fishing methods and gear of Cornwall, England; Cornish methods of preservation.

Ws____, ______. 1921. Sardinerfang und industrie in Frankreich. Fischerbote, no. 23, p. 965.
Sardine fishing and industrial conditions in France.

2.24. Y

Clupea pilchardus: synonymy; food; Cornwall fishing methods.

Sardinia neopilchardus: full synonymy for New Zealand; distribution.

2.25. Z

Clupea sajax: distribution.
### 3. LIST OF ABBREVIATIONS USED FOR PERIODICALS CITED

**A**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proc.</td>
<td>Proceedings</td>
</tr>
<tr>
<td>C, R.</td>
<td>Compte Rendu.</td>
</tr>
<tr>
<td>Mém.</td>
<td>Mémoires.</td>
</tr>
<tr>
<td>Anz.</td>
<td>Anzeiger.</td>
</tr>
<tr>
<td>Denkschr.</td>
<td>Denkschriften.</td>
</tr>
<tr>
<td>Sitzber.</td>
<td>Sitzungsberichte</td>
</tr>
<tr>
<td>American Fish Culturist.</td>
<td>American Fisheries Society.</td>
</tr>
<tr>
<td>Trans.</td>
<td>Transactions.</td>
</tr>
<tr>
<td>C, R.</td>
<td>Compte Rendu de la Session.</td>
</tr>
<tr>
<td>Rec.</td>
<td>Records.</td>
</tr>
</tbody>
</table>

**B**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verh.</td>
<td>Verhandlingen.</td>
</tr>
<tr>
<td>Journal Name</td>
<td>Institution/Location</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Bull.</td>
<td></td>
</tr>
<tr>
<td>New York State Mus.</td>
<td>New York State Museum. Albany.</td>
</tr>
<tr>
<td>Outlook</td>
<td>Chicago.</td>
</tr>
<tr>
<td>Mem.</td>
<td>Memorias.</td>
</tr>
<tr>
<td>R. Inst. Cornwall</td>
<td>Royal Institution of Cornwall.</td>
</tr>
<tr>
<td>Journal Name</td>
<td>Institution</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Proc.</td>
<td>Proceedings</td>
</tr>
<tr>
<td>Pap.</td>
<td>Papers and Proceedings</td>
</tr>
<tr>
<td>Proc.</td>
<td>Proceedings</td>
</tr>
<tr>
<td>Proc.</td>
<td>Proceedings</td>
</tr>
<tr>
<td>Australian Zoological Handbook</td>
<td></td>
</tr>
<tr>
<td>Cont.</td>
<td>Revue Maritime.</td>
</tr>
<tr>
<td>Scripps Instn. Oceanogr.</td>
<td>Scripps Institution of Oceanography. La Jolla, California.</td>
</tr>
<tr>
<td>Smithsonian Instn.</td>
<td>Smithsonian Institution. Washington, D. C.</td>
</tr>
<tr>
<td>Misc. Coll.</td>
<td>Miscellaneous Collections.</td>
</tr>
<tr>
<td>C. R.</td>
<td>Comptes Rendus Hebdomadaire des Sciences et Mémoires.</td>
</tr>
<tr>
<td>An.</td>
<td>Anales.</td>
</tr>
<tr>
<td>Atti.</td>
<td></td>
</tr>
<tr>
<td>Institution Name</td>
<td>Location</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Rod. Pescas.</td>
<td>Boletín de Pescas.</td>
</tr>
<tr>
<td>Res. Camp.</td>
<td>Resultados de las Campañas Realizadas por Acuerdos Internacionales.</td>
</tr>
<tr>
<td>Trab.</td>
<td>Trabajo.</td>
</tr>
<tr>
<td>Ann.</td>
<td>Anuales.</td>
</tr>
<tr>
<td>Oliver</td>
<td>Oervers af Forhandlingar.</td>
</tr>
<tr>
<td>Mitt.</td>
<td>Mitteilungen.</td>
</tr>
<tr>
<td>Tokyo Coll. Agric.</td>
<td>Tokyo Imperial University. College of Agriculture.</td>
</tr>
</tbody>
</table>
Treubia.—Recueil de Travaux Zoologiques, Hydrobiologiques et Océanographiques. Batavia.

U

  Bull.—Bulletin.
  Mem, Ser.—Memorandum Series.
  Bull.—Bulletin.
  (This department includes the United States Bureau of Fisheries.)
  Bull.—Bulletin.
  Rept.—Report.
  Fish. Sci. Trade.—Fisheries Science and Trade.
  Bull.—Bulletin.
  Proc.—Proceedings.

  Rept.—Report.

Univ. Calif.—University of California. Berkeley.

W

  Mem.—Memoirs.


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

  Abt. Kiel.—Abteilung Kiel.

Y

Yacht.—Le Yacht. Paris.


  Arb.—Arbeiten.
  Proc.—Proceedings.
  Trans.—Transactions.

  Mitt.—Mitteilungen.

Zoologist.—London.
# INDEX OF SUBJECTS

## A

<table>
<thead>
<tr>
<th>Subject</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>105</td>
</tr>
</tbody>
</table>

### ABNORMALITIES
- Sardina caerulea
- Sardina pilchardus

### AGE
- Sardina caerulea
  - Stoddard, B. B. 1913.2.
  - Thompson, W. F., 1926.1.
- Sardina pilchardus
  - Arné, 1928.1, 1928.2.
  - Buen, F., 1919.3, 1924, 1925.
  - Buen, R., 1927.
  - Fage, 1913.
  - Jenkins, 1902.
  - Navarro, 1926.
  - Storrow, 1915.

### AIRCRAFT FOR DISCOVERY OF SCHOOLS OF SARDINES
- California
  - Calif. Fish Game, 1920.
  - Scofield, N. B., 1919.1.
- France
  - Belloc, 1927.
  - Cassigneul, 1928.
  - Pêch. Marit., 1926.4, 1926.6.

### ALAUSA CALIFORNICA
- See Sardina caerulea.

### ALAUSA MELANOSTICTA
- See Sardina melanosticta.

### ALAUSA (ALOSA) PILCHARDUS
- See Sardina pilchardus.

### ALOSA MUSICA
- Description
  - Girard, 1854, 1855.
  - Recorded from Chili.
- Authors using former name
  - Acloque, 1900.
  - Bounhiol, 1923.1.
  - Canestrini, 1871.
  - Caraffa, 1902, 1929.
  - Fabre-Domergue and Biétrix, 1897.
  - Ferrer y Hernández, 1903.
  - Gourret, 1894.2, 1894.3, 1894.7.
  - Joubin, 1913.
  - Moreau, E., 1881.
  - Ravertet-Wattel, 1909.
  - Roché, 1893.2.
  - Roule, 1914.
  - Sauvage, 1865, 1889, 1893.
  - Steindachner, 1865.
  - Tressler and Wells, 1925.

### ALTERNATION IN ABUNDANCE
- Aflalo, 1904.1.
- Buen, F., 1927.2, 1929.4, 1929.5.
- Hornell, 1910.
- Hornell and Nayudu, 1924.

### AMBLYGASTER NEOPILCHARDUS
- See Sardina neopilchardus.

### ANATOMY
- Sardina caerulea
  - of cranium
    - Starks, 1926.
  - of muscles
    - Greene and Greene, 1915.
- Sardina melanosticta
  - of cranium
    - Kishinouye, 1907.
- Sardina pilchardus
  - 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.
    -月末, 1906.
    - Stoddard, B. B. 1913.2.
    - Willughby, 1685.

### ARTIFICIAL FERTILIZATION
- Cunningham, 1889, 1897 (first successful attempt described).
<table>
<thead>
<tr>
<th>B</th>
<th>BACTERIOLOGY OF CANNED SARDINES. See Canning, Bacteriology.</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>BAIT</td>
</tr>
<tr>
<td>BA</td>
<td>Certain kind detrimental to fish Kerzoncuf, 1917.</td>
</tr>
<tr>
<td>BA</td>
<td>History of use Landrieu, 1904.</td>
</tr>
<tr>
<td>BA</td>
<td>Price of Pérard, 1913.</td>
</tr>
<tr>
<td>BB</td>
<td>BEHAVIOR</td>
</tr>
<tr>
<td>BB</td>
<td>BIBLIOGRAPHY</td>
</tr>
<tr>
<td>BB</td>
<td>BOATS</td>
</tr>
<tr>
<td>BB</td>
<td>BY-PRODUCTS</td>
</tr>
<tr>
<td>BB</td>
<td>CANNERS</td>
</tr>
<tr>
<td>BB</td>
<td>Association in California Pacific Fish., 1929.6, 1930.1. West Coast Fish., 1901, 1901.8, 1927.3. List of firms in California Pacific Fish., 1929.6, 1930.1. CANNING</td>
</tr>
</tbody>
</table>
Methods

Adriatic
Knehr, 1906.

California
Beard, 1921, 1923, 1924, 1925, 1928.
Brown, C. M., 1930.
Calif. Fish Game, 1916.1.
Cobb, 1919.
Collins, J. H., 1924.
Fay, 1929.
Fish. Gaz., 1918.
Griffin, 1904.2.
Hawkins, 1929.1.
Lang, 1929.
Lang and Dean, 1928.1, 1928.2.
Lemy and Montariol, 1918.
Pêch. Marit., 1928.3.
Sette, 1925, 1926.2.
Smith, H. M., 1895.
Starks, 1918.
Taylor, 1918.
Thompson, F. F., 1921.
Tressler, 1923.
West Coast Fish., 1930.3, 1931.2.

Canada
Avard, 1918.
Griffith, 1880.
Pacific Fish., 1903.1, 1911.2.

Chile
Castillo, 1912.

England
Bertram, 1869.
Graphic, 1880.
Pacific Fish., 1904.1.
Smith, W. A., 1883.2.

Europe
American Fish Culturist, 1904.
Beard, 1928.
Baudouin, 1888, 1893.2.
Benoit, 1912.
Boyer, 1913.
Caye, 1903.
Chauvin, 1909.
Cligny, 1913.
Collins, J. H., 1924.
Dumont, 1919.
FiskTid., 1882.
Fryer, 1887.
Jacobsen, 1845.
Kergorlay, 1929.
Lang, 1883.
Lemy, 1888.
Lemy and Poisindran, 1886.
Mull, 1913.
Pêter, 1880.
Roché, 1929.
Saint-Léon and Seilhac, 1913.
Sauvage, 1885.
Smith, H. M., 1882.2.
Smith, W. A., 1883.2.
Stahmer, 1913.
Tenorio, 1932.
Weber, 1921.

India
Nicholson, 1921.

Italy
Pavone, 1926.

Java
Earll, 1887.2.
Earll and Smith, 1889.
Fish. Gaz., 1925.
Griffin, 1904.2.
Hall, 1898.
McFarland, 1911.
Possibilities in Puget Sound Pacific Fish., 1903.
Swan, 1894.

Maine
Beard, 1928.
Earll, 1887.2.
Earll and Smith, 1889.
Fish. Gaz., 1925.
Griffith, 1904.2.
Hall, 1898.
McFarland, 1911.
Pacific Fish., 1903.1, 1903.2.
Smith, H. M., 1911.2.
Smith, W. A., 1883.2.
Stahmer, 1913.
Tenorio, 1932.
Weber, 1921.

Norway
Fish Trades Gaz., 1912.
Gruvel, 1922.
Stahmer, 1913.
Tressler, 1923.

Philippines
Seale, 1914, 1916.

Portugal
Fish Trade Gaz., 1931.

United States
Canning Trade, 1914.
Fish. Gaz., 1927.

Philippines
Daly, J. J., 1908.
Portugal
Fish Trade Gaz., 1931.

New South Wales
Knehr, W. R., 1925.
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.
M'Coy, 1867.

CLUPANODON NEOPILCHARDUS. See Sardina neopilchardus. Authors using former name

Fowler, 1911.
Roughly, 1916.
Stead, 1906, 1908.
Waite, 1899, 1904, 1905.

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.
Sumner, Osburn and Cole, 1913.
Weymouth, 1909.


CLUPANODON SAJAX. See Sardina sajax. Authors using former name

Abbott, 1900.
Fowler, 1916.

CLUPANODON SARDNA. See Sardina pilchardus. Authors using former name

Risso, 1826.

CLUPANODON TIRIBISA. Authors using former name

Regan, 1917.

CLUPEA. Description GIS 1843.

CLUPEA CAERULEA-VITTATA. Coloration. Broderson, 1845.

CLUPEA CAERULEA. See Sardina caerulea. Authors using former name

Jordan and Evermann, 1896.1, 1908.


CLUPEA LONGICEPS. See Sardinella longiceps. Authors using former name

Hertling, 1930.

CLUPEA MELANOSTICTA. See Sardina melanosticta. Authors using former name

Günther, 1868.
Kishinouye, 1907.
McCoy, 1867.
Srinath and Aliakmona, 1920.
Sumner, Osburn and Cole, 1913.
CLUPEA OCELLATA. See Sardina ocellata.
CLUPEA PILCHARDUS. See Sardina pilchardus.
CLUPEA SAJAX (Sagax). See Sardina Sajax.
CLUPEA SAJAX. See Sardina pilchardus.
CLUPEA SARDINA. See Sardina pilchardus.

Authors using former name
Bean, 1880.
Blanchère, 1868.
Caillo, 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
Pauca, 1929.

Synonomy
Woodward, 1891.
Territory of Guad
Anatomical characteristics, 1885.
Listed from west coast of Africa
Giraud and Rasse, 1908.

COMMERICAL 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, 1880.
France
Guérin-Ganivet, 1912.
Joubin and Le Danois, 1921.

ITALY
Carus, 1889.
Joubin and Le Danois, 1924, 1928.
Lacépède, 1829.
Moreau, E., 1881.

FRANCE
Guérin-Ganivet, 1912.
Le Danois, 1913, 1921.

Japon
Canestrini, 1871.

KOREA
Kwon, 1934.

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
Guyader, 1926.
Petit, Benoit, Rivoal and Touchard, 1913.
Saint-Léon and Seilhac, 1913.

CONSERVATION OF FISHERIES
California
Clark, F. N., 1930.1.
Lindner, 1930.2.
Scofield, W. L., 1930.1.
Thompson, W. F., 1930.1.
Thompson, W. F. and Higgins, 1943.

France
Pouchet, 1887.3, 1891.2.

STOCK TAKING
California
Bonnot, 1930.
Scofield, W. L., 1930.1.
Thompson, W. F., 1930.1.
Thompson, W. F. and Higgins, 1943.

FRANCE
Fahy-McDonald, 1909.
Pouchet, 1887.3.

DEPLETION OF FISHERY
California
Bonnot, 1930.
Scofield, W. L., 1930.1.
Thompson, W. F., 1930.1.
Thompson, W. F. and Higgins, 1943.

France
Pouchet, 1887.3, 1891.2.

DESTRUCTION OF NAME
Fishing
Clark, F. N., 1930.1.

DECLINE IN FISHERY
California
Clark, F. N., 1930.1.
Thompson, W. L., 1930.1.

France
Pouchet, 1887.3.

DESTRUCTION OF FISHERY
California
Bonnot, 1930.
Scofield, W. L., 1930.1.

France
Pouchet, 1887.3, 1891.2.

DERIVATION OF NAME
French
Cligny, 1913.

DESTRUCTIVE FISHING GEAR
Algeria
Roché, 1894.3.

California
Bonnot, 1930.
Scofield, W. L., 1930.1.
Thompson, W. F., 1930.1.
Thompson, W. F. and Higgins, 1943.

France
Pouchet, 1887.3.

DESTRUCTIVE FISHING GEAR
Wreck caused by large school sounding in net
California
Bull. Calif. Fish., 1929.2.

PHILIPPINE ISLANDS
Thompson, W. F., 1926.

DISASTER TO BOATS
Wreck caused by large school sounding in net
California
Bull. Calif. Fish., 1929.2.

PHILIPPINE ISLANDS
Thompson, W. F., 1926.

DESTRUCTIVE FISHING GEAR
Wreck caused by large school sounding in net
California
Bull. Calif. Fish., 1929.2.

PHILIPPINE ISLANDS
Thompson, W. F., 1926.

DISASTER TO BOATS
DISEASE OF SARDINES
Sardina pilchardus

DISTRIBUTION OF COMMERCIAL PRODUCT

ECONOMIC CONDITIONS OF FACTORY WORKERS

ECONOMIC CONDITIONS OF FISHERMEN

ENEMIES

FAT CONTENT

EGGS
Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS

Sardina caerulea

Sardina melanosticta

Sardina pilchardus

EGGS

ENEMIES

FAT CONTENT

EGGS
Barron, 1897.
Borlase, 1758.
Buckland and Walpole, 1879.
Bullen, 1904.
Cornish, 1883, 1870, 1872, 1880.
Couch, 1835, 1840.
Courtenay, 1837, 1840.
England Bd. Ag. Fish., 1906.
Kyle, 1929.
Lemon, 1785.
Murie, 1903.
Pengelly, 1928.
Swithinbank and Bullen, 1914.
Esthonia Vienkoff, 1893.
Europe Buen, F., 1928.
Noël de la Morinière, 1815.
Steuer, 1908.
France Amieux, 1909, 1912.
Argentier, 1919.
Arné, 1928.1, 1929.
Baudouin, 1888, 1893.1, 1893.2.
Belloc, 1930.
Bonnassieux, 1900.
Bouchon-Brandeley, 1887.
Bouvier-Lapierre, 1887.
Boyer, 1912.
Caillo, 1855.
Cligny, 1913, 1914.
Cloarec, 1913.
Delcassé, 1912.
Dokinsky, 1923.
Fabi-Donnetgay, 1808.
Gourret, 1889.1, 1894.1, 1894.2, 1894.3, 1894.4, 1894.5, 1894.6, 1894.7, 1897.
Hérubel, 1912.
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.
Mussat, 1877.
Ouizille, G., 1912.1, 1912.2.
Ouizille, H., 1926.1, 1926.2, 1926.3.
Peixotto, 1884.
Pouchet, 1898.1, 1899.2, 1899.3, 1899.4.
Pouët, 1924.4.
Rabillier, 1909.
Ravertet-Wattel, 1909.
Roché, 1894.2.
Rodel, 1912.
Saint-Léon and Seilhac, 1913.
Sée, 1925, 1929.1, 1929.2.
Seilhac, 1903.
Trévédy, 1888.
Vauvert, 1870.
Vignols and Sée, 1926.
W., 1921.
Libya Sella, 1912.
Mexico Crowell, 1918.
Peru Murphy, 1923.
Philippine Islands Montalban, 1930.
Nobre, 1895.1, 1895.2.
Pêch. Marit., 1924.3.
Ramalho, 1927.
Sicily Russo, 1925.
Spain Alaejos Sanz, 1923.
Bolin y de la Cámera, 1922.
Buen, F., 1922.2, 1927.2.
Buen, O., 1923.
Cornide, 1788.
Dominguez, 1922.
Hérubel, 1912.
Miranda y Rivera, 1923.
Revue Marit., 1904.
Thompson, W. F., and Higgins, 1923.
West Coast Fish., 1930.1, 1930.2, 1931.1.

Corsica
Argentier, 1919.

Caraffa, 1929.

England
Allee, 1944.1, 1962.2.
Bartram, 1806.1, 1833.
Berkeley, 1811.
Blainville, 1837.
Collins, W. W., 1851.
Couch, 1835, 1867.
Courtenay, 1837.
Cunningham, 1912.
Davis, 1927.
Day, 1880, 1883.
Duhamel du Monceau, 1772.
Duke of Edinburgh, 1883.
Dunn, Matthias, 1888.1.
Hamilton, 1843.
Holdsworth, 1874, 1877, 1883.
Houghton, W., 1883.
Hume, 1879.
Sauvage, 1865.
Smith, W. A., 1892.

Europe
Thompson, W. F., 1926.1.
France
Amieux, 1912.
Barclay, 1910.
Baudouin, 1888, 1893.2.
Bénard, 1903.
Bénard and Künstler, 1903.
Benoit, 1912.
Blanchère, 1868.
Bonneff, 1911.
Boyer, 1913.
Caillo, 1855.
Cassigneul, 1928.
Cuvier and Valenciennes, 1831, 1848.
Delidon, 1866, 1869.
Dumont, 1919.
Fabre-Domergue, 1912, 1913.
Fischerbote, 1931.
Fish. Gaz., 1917.
FiskTid, 1882.
Fouché, 1923.1.
Gerville-Réache, 1888, 1908.
Gourret, 1894.7.
Guyader, 1926.
Hérubel, 1912.
Jacobson, 1883.
Jacquème, 1926.
Kerzoncuf, 1917.
Künstler, 1903.
Le Bail, 1912.
Le Gall, 1930, 1931.
Larousse Universel, 1923.
Lowe, J., 1864.
Lübbert, 1931.
Mader, 1909.
Martinet, 1887.
Moniteur de la Pisciculture, 1886.
Müller, 1909.
Odin, 1894.
Pêch. Marit., 1924.5, 1926.5.
Pouchet, 1887.1, 1888.2.
Potigny and Fabre-Domergue, 1908.
Ravertet-Wattel, 1909.
Roché, 1894.1, 1894.2, 1894.3.
Rodel, 1913.
Ropers, 1906.
Sauvage, 1865.
Sée, 1929.2.
Seilhac, 1903, 1905.
Simmonds, 1879.
Smith, H. M., 1902.1, 1904, 1909.
Soc. Arts, 1882.
Thompson, W. F., 1926.1.

India
Scofield, N. B., 1925.

Maine
Earll, 1887.2.
Earll and Smith, 1889.

Mediterranean
Cuvier and Valenciennes, 1831.
Duhamel du Monceau, 1772.

Mexico
Carr and Valkenier, 1831.

New Zealand
Phillips, 1929.

Portugal
Bénard, 1903.
Fish. Gaz., 1917.
Fischerbote, 1931.

Spain
Alba, 1847.
Buen, F., 1928.2.
Chute, 1929.1.
Delgado, 1921.
Miranda y Rivera, 1923.
Pêch. Marit., 1924.3, 1928.5.
Reguart, 1791.
Rodriguez, 1908.
Santamaría, 1923.
Sherrin, 1886.
Smith, W. A., 1892.

Turkey
Devedjian, 1926.
Ninni, 1923.

Washington (State)
Swan, 1894.

Washinton (Shale)

FLUCTUATIONS IN ABUNDANCE

Algeria
Armbruster, 1910.

Australia
Bennett, 1867.
California
Higgin, 1863, 1866.
Thompson, W. F., 1921.4.
Cornish, 1872.
Smith, H. M., 1905.

France
Thompson, W. F., 1926.1.

Spain
Buen, F., 1927.2.

Portugal
Neuparth, 1923.

Italy
Russo, 1925.

England
Aflalo, 1904.1.

F. F., 1929.2.

Sicily
Russo, 1925.

Sardinia caerulea
British Columbia Comm. Fish., 1931.
Lewis, 1929.
Parr, 1930.

Sardina melanosticta
Kishinouye, 1907.

Sardina neopilchardus
Roughly, 1916.

Sardina pilchardus
Albert, 1887.

Sardina pseudohispanica
Sumner, Osburn and Cole, 1913.

Sardina saxax
Arthur, 1883.

Sardina sajax
Regan, 1916.1.

Sardina sajax
Regan, 1916.1.

Sardinella longiceps
Hornell, 1910.
Hornell and Nayudu, 1924.

FOOD VALUE
Sardina caerulea
Beard, 1921.
Christo, 1931.
Dill, 1929.
Johnstone, 1919.
Pacific Fish., 1929.9.

Sardina pilchardus
Day, 1883.
Dumont, 1919.
Johnstone, 1919.
Pérard, 1909.2.
Thomas, 1926.

FOSSILS
Clupea sardinites
Kramberger-Gorjanovic, 1883.
Pauca, 1929.
Woodward, 1901.

Meletta sardinites
Heckel, 1850.
Vukotinovića, 1870.

GROWTH
Sardina caerulea
Scofield, N. B., 1923.1.
Thompson, W. F., 1926.2.

Sardina melanosticta
Kishinouye, 1887.

Sardina pilchardus
Belloc, 1930.
Belloc and Desbrosses, 1930.
Bounhiol, 1916, 1919.2.
Buen, F., 1927.3, 1929.3.
Couch, 1867.
Cunningham, 1891, 1892.1, 1892.2, 1892.3, 1892.4, 1894.5, 1896, 1912.
Dunn, Matthias, 1892.2.
Gourret, 1894.2, 1894.3.
Hjort, 1913.
Jacquème, 1926.
Joubin, 1913.
Lebour, 1921.1.
Le Danois, 1929.
Le Gall, 1928.1, 1928.2, 1930.
McIntosh and Masterman, 1897.
Marion, 1891.2, 1894.1.
Meek, 1916.
Navarro, 1926.

Sardina sajax
Regan, 1916.1.

Sardinella longiceps
Hornell and Nayudu, 1924.

Sarcoptes scabiei
Hendell and Nauta, 1954.

113
HABITAT
Sardina neopilchardus
Phillipps, 1929.
Sardina pilchardus
Baudouin, 1893.2.
Cunningham, 1896.
Day, 1883.
Dumont, 1919.
Moreau, E., 1881.
Ropers, 1906.
Roule, 1914.
Vaillant and Henneguy, 1888.

HABITS
Sardina caerulea
Goode, 1903.
Lewis, 1929.
Sardina melanosticta
Kishinouye, 1907.
Sardina neopilchardus
McCulloch, 1919, 1922.
Roughly, 1916.
Sardina pilchardus
Aflalo, 1904.2.
Cornish, 1883.3.
Couch, 1867.
Day, 1880.
Dunn, Matthias, 1886, 1887, 1892.1.
McIntosh and Masterman, 1897.
Parnell, 1838.
Ravertet-Wattel, 1909.
Sauvage, 1865.
Smith, W. A., 1892.
Swithinbank and Bullen, 1913.
Sardina sajax
Goode, 1903.
Murphy, 1923.

HARENGULA PUNCTATA = CLUPEA SAJAX
Description
Bleeker, 1853.

HARENGULA SARDINA.
See Sardina pseudohispanica.

AUTHORS USING FORMER NAME
Goode and Bean, 1880.
Poey y Aloy, 1856.

HISTORY OF FISHERY
California
Brown, C. M., 1930.
Fiedler, 1930.2.
Jordan, 1887.4.
Lindner, 1931.
Smith, H. M., 1896.
Thompson, W. F., 1921.6, 1922.
West Coast Fish., 1930.2.
Wilcox, 1898.

England
Couch, 1835, 1840.
Courtenay, 1837.

Europe
Steuer, 1908.

France
Baudouin, 1893.1, 1893.2.
Bonnassieux, 1900.
Cligny, 1913, 1914.
Deslandes, 1927.
Le Bour, 1909.
Mader, 1909.
Ouizille, G., 1912.2.
Ouizille, H., 1926.1, 1926.2, 1926.3.
Pouchet, 1888.2.
Roché, 1894.2.
Saint-Léon and Seilhac, 1913.
Sée, 1925, 1929.1, 1929.2.
Trévédy, 1888.
Vignols and Sée, 1926.

Maine
Earll, 1877.2.
Earll and Smith, 1889.
Hall, 1908.

HYDROGRAPHIC CONDITIONS — EFFECT ON MIGRATIONS
Currents
Blavier, 1882.
Gifford, 1883.
Gourret, 1889.2.
Launette, 1888.
Mader, 1909.
Ravertet-Wattel, 1909.
Ropers, 1906.
Density of water
Atak, 1927, 1928.2.
Mader, 1908.
Electrolycity
Bounhiol, 1919.1.
Boyer, 1912.
In general
Theureau, 1915.

Salinity
Belloc, 1930.

Temperature of water
Atak, 1927, 1928.2.
Belloc, 1930.
Mader, 1908.
Ropers, 1906.

Winds
Baudouin, 1893.2.
Mader, 1909.
Pouchet, 1889.1.
Ropers, 1906.

IMPROVEMENT OF FRENCH FISHERY
Government aid
Fish. Gaz., 1917.
Fish. Gaz., 1920.
Report of progress
Fish. Gaz., 1917.
Benoit, 1912.
Boyer, 1912.
Canu, 1908, 1912.
Chauvin, 1909.
Cloarec, 1913.
Fabre-Domergue and Biétrix, 1896.3.
Fouché, 1923.1, 1923.2.
Gerville-Réache, 1908.
Gruvel, 1913.
Hérubel, 1912, 1919.
Lemy, 1912.
Mader, 1909.
Madurec, 1912.
Odin, 1891, 1896.
Ropers, 1906.
Sanity
Belloc, 1930.
Storms
Bounhiol, 1917.2, 1924.
Temperature of water
Aitak, 1927, 1928.2.
Belloc, 1930.
Mader, 1908.
Ropers, 1906.

Winds
Baudouin, 1893.2.
Mader, 1909.
Pouchet, 1889.1.
Ropers, 1906.
Pérard, 1909.1, 1913.3.
Pouchet, 1887.1.
Rodel, 1912.
Ropers, 1906.
Rouillon, 1898.
Seilhac, 1903, 1905.

INDUSTRY

Algeria
Argentier, 1919.
Gruvel, 1926.1.

British Columbia
British Columbia Comm. Fish., 1930.
Canadian Fish., 1928, 1929.1, 1929.5.
Hemming, 1919.
Pacific Fish., 1924.3, 1927.3.
Scofield, N. B., 1925.

California
Bol. Pescas, 1929.
Calif. Fish Game, 1917, 1930.2.
Collins, J. W., 1892.
Ehrenbaum, 1929.
Fish. Gaz., 1918.
Fish Trades Gaz., 1930.
Griffin, 1904.1.
Lindner, 1931.
Quibbon, 1927.
Radcliffe, 1923.1.
Tendick, 1931.
West Coast Fish., 1929.7, 1930.9.
Wilcox, 1907.

England
Borlase, 1758.
Bullen, 1904.
Fish Trades Gaz., 1930.

Europe
Borlase, 1758.
Bullen, 1904.
Fish Trades Gaz., 1930.

France
Amieux, 1909.
Argentier, 1919.
Belloc, 1930.
Berthoule, 1887.2.
Bol. Pescas, 1926.1, 1926.2.
Candace, 1927.
Dumont, 1919.
Fabre-Domergue, 1896.1.
Fish. Gaz., 1909.
France Chamb. Dép., 1913.
Gerville-Réache, 1888.
Guyader, 1926.
Hérubel, 1912, 1919.
Kerzoncuf, 1917.
Larrousse, 1923.
Lemy, 1926.
Lowe, J., 1864.
McKay, 1922.
Mader, 1909.
Moreau, R., 1924, 1927.
Nicolas, 1913.
Pouchet, 1888.2.
Smith, H. M., 1902.1.

Maine
Earll, 1887.1.
Earll and Smith, 1889.
Goto (no date).
Hall, 1898.
Kemp, 1885.

Norway

Portugal
Fischerbote, 1930.
Potigny and Fabre-Domergue, 1908.

New South Wales
Scofield, N. B., 1925.
New Zealand
Thomson, J. A., 1918.

Spain
Brown, C. I., 1918.
Ducloux, 1901.
Hérubel, 1912.
Potigny and Fabre-Domergue, 1908.
Vachez, 1913.1, 1913.3.

United States
Hjort, 1913.
Perwinck, 1919.

Washington and Oregon
Coker, 1921.
Swan, 1894.
Ehrenbaum, 1909, 1927.
Fabre-Domergue and Biétrix, 1896.1, 1896.3, 1897.
Fage, 1920.2.
Holt, 1899.
Joubin, 1913.
Lebour, 1921.1.
Le Gall, 1928.2.
McIntosh and Masterman, 1897.
Marion, 1889.2, 1894.1, 1894.3.
Mazarelli, 1910.
Prince, 1907.
Raffaele, 1888.
Ravertet-Wattel, 1909.
Roché, 1893.2.
Roule, 1914.
Roule and Angel, 1924.
Steuer, 1908.
Sardina sajax
Barnard, 1925.
Six sardine-like species from Java Sea
Delsman, 1926.
Vertical distribution
Russell, F. S., 1926.
LENGTH STUDIES
Sardina caerulea
Andrews, 1928.
British Columbia Comm. Fish., 1931.
Godsil, 1931.
Scofield, W. L., 1925.1, 1926.2.
Sette, 1926.1.
Thompson, W. F., 1921.3, 1926.2.
Sardina melanosticta
Oku, 1904.
Sardina pilchardus
Belloc, 1930.
Bouvier-Lapierre, 1887.
Buen, F., 1919.2, 1929.2.
Buen, O., 1910.
Buen, R., 1927.
Cligny, 1919.
Cornish, 1879.
Cunningham, 1892.3, 1892.4.
Fabre-Domergue, 1896.
Gourret, 1894.2, 1894.3, 1894.5.
Le Gall, 1928.2, 1930.1, 1930.2.
Lozano y Rey, 1921.
Marion, 1894.1.
Pouchet, 1889.1, 1889.2, 1889.3, 1889.4, 1890.1, 1891.1, 1891.2, 1891.4.
Pouchet and Biétrix, 1892.
Scofield, W. L., 1925.1.
Scofield, E. C., and Lindner, 1930.
Sardina pilchardus
Bénard, 1903.
Buen, F., 1927.1, 1929.3.
Buen, R., 1927.
Caillo, 1855.
Cunningham, 1892.
Fabre-Domergue, 1896.
Hjort, 1913.
Marion, 1889.1.
MACHINERY
Canning
Beard, 1928.
Pacific Fish., 1928.1, 1928.2.
West Coast Fish., 1929.8.
Reduction of sardines to fertilizer and oil
Pacific Fish., 1919.2, 1926.3.
Scofield, W. L., 1921.
Refrigeration
West Coast Fish., 1929.10.
Whitehead, 1927.
MARKETS
Chile
Houghton, M. T., 1930.
Scofield, N. B., 1922.
For California product
Pacific Fish., 1915+, 1929.9, 1930.7.
West Coast Fish., 1930.7.
For French product
Ouizille, H., 1926.4.
Greece
Lyons, 1930.
Mexico
Radcliffe, 1923.3.
Orient
Dollar, 1927.
Farnsworth, 1930.
World
Pacific Fish., 1929.9.
U. S. D. C., Food 'Round World, 1925+.
MEASUREMENTS, PROPORTIONAL
Sardina caerulea
Thompson, W. F., 1926.1.
Sardina pilchardus
Belloc, 1930.
Buen, F., 1919.1.
Le Gall, 1928.1, 1928.2, 1930.
Thompson, W. F., 1926.1.
MELETTA
Description
Gill, 1862.
Von Zittel, 1902.
MELETTA CAERULEA.
See Sardina caerulea.
Authors using former name
Girard, 1854.
MELETTA PHALERICA
Fishing methods and gear in Greece
Apostolidès, 1883.
Fishing seasons
Apostolidès, 1883.
MELETTA SARDINITES
Description
Vukotinovića, 1870.
Figured
Von Zittel, 1902.
Fossils from Austria
Heckel, 1850.
METAMORPHOSIS
Sardina pilchardus
Buen, F., 1929.3.
Buen, R., 1927.
Caillo, 1855.
Cornish, 1879.
Cunningham, 1892.
Fabre-Domergue, 1896.
Hjort, 1913.
Marion, 1889.1.
MEGALOPS
Description
Gill, 1862.
Scofield, E. C., 1928.
Buen, R., 1927.
Caillo, 1855.
Chester, 1835.
Cornish, 1883.
Day, 1880, 1883.
Deslandes, 1727.
Duhamel du Monceau, 1772.
Dumont, 1919, 1929.
Dunn, Matthias, 1892.
Fabre-Domergue, 1896.
Gifford, 1883.
Gobin, 1891.
Guéry, 1893.
Hérubel, 1912.
Hjort, 1913.
Hoek, 1914.
Holdsworth, 1874.
Houghton, W., 1883.
Joubin, 1913.
Künstler, 1903.
Le Gall, 1928, 1930.
M., 1903.
Mader, 1909.
Marchand, 1926.
Marin, 1883, 1884.
Musk, 1839.
Parnell, 1838.
Pouchet, 1890, 1891.
Rodriguez, 1908.
Ropers, 1906.
Sauvage, 1865.
Smith, H. M., 1892.
Smitt, 1892.
Sardina sajax
Eigenmann, 1893.
Macleay, 1880.
Ramsay, 1883.
Sardinella longiceps
Hornell, 1910.
Hornell and Nayudu, 1924.
Sardina pilchardus
Arné 1929.
Belloc, 1930.
Lombardo, 1884.
Steuer, 1908.
NOMENCLATURE
Berg, 1913.
Bleeker, 1853.
Bloch, 1797.
Caillo, 1855.
Hubbs, 1929.
Regan, 1916.
Waite, 1916.
O
OTOLITHS
Anatomy
Scott, 1906.
Steuer, 1908.
In relation to age
British Columbia Comm. Fish., 1931.
Jenkins, 1902.
PARASITES
Copepods
Baudouin, 1904, 1905, 1907, 1908, 1909, 1910, 1911.
Day, 1880, 1883.
Giard, 1888.
Joubin, 1888.
Richiardi, 1875.
Thélohan, 1890.
More than one kind
Baudouin, 1905.
Day, 1880, 1883.
Gibert, 1913.
Linton, 1901.
Monticelli, 1887.
Sauvage, 1890.
Sumner, Osburn and Cole, 1913.
Nematodes
Biden, 1930.
Cépède, 1908.
PLANKTON—RELATION TO ABUNDANCE
Hornell and Nuttall, 1914.
PREDICTION OF FISHERY
Clark, F. N., 1931.
PRESERVATION METHODS
Algeria
Gara, 1916.
California
Clark, E. D., and Davi, 1918.
DEW, 1924.
Pacific Fish., 1900-1924.
Oddon, M. R., 1919.
Algeria
Apperio, 1891.
England
Adara, 19141.
Berman, 1900, 1903.
Beddard, 1894.
Buckland, 1881.
Collin, 1911.
Cook, 1857, 1882.
Cross, 1884.
Cunningham, 1812.
Day, 1880, 1883.
Holmwood, 1874.
Holmwood, W., 1883.
Pugny, 1828.
Pugny, 1822.
Steuer, 1908.
Sherrin, 1886.
Wright, 1883.
Wright, 1882.
Apperio, 1891.
Berle, 1916.
SARDINA

Anatomy of cranium  
Starks, 1926.

Classification  
Chabanaud, 1926.

Description  
Aldrovandi, 1638.

Figured  
Bonnaterre, 1788.

Nomenclature  
Berg, 1913.

SARDINA CAERULEA  
A comparison of two sardines of world  
Thompson, W. F., 1921.1.

Compared with  
Sardina pilchardus  
Thompson, W. F., 1921.1.

Description  
Girard, 1854.

Distribution  
Goode, 1903.

Eggs  
Calif. Fish. Game, 1929.2.
Pacific Fish., 1929.4.

Fat content  
Dill, 1921.3.

Fishing areas—California  
Chute, 1929.2.

Fishing seasons—California  
Collins, J. W., 1892.

119
<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SARDINA DOBROGICA</td>
<td>Antipa, 1906</td>
<td>Comparison with Sardina pilchardus</td>
</tr>
<tr>
<td>SARDINA MELANOSTICTA</td>
<td>Cuvier and Valenciennes, 1831</td>
<td>Common names, Japanese, Korean, Philippine Islands</td>
</tr>
</tbody>
</table>

**Antipa, 1906**

- **Description**: Antipa, 1904, 1906.
- **Figured**: Antipa, 1906.
- **Methods of fishing in Black Sea**: Antipa, 1906.
- **Chemical composition**: Pentegoff and Niankovskaya, 1928, Sekiné and Akiyama, 1926.
- **Classification**: Cuvier and Valenciennes, 1831.
- **Common names**: Japanese: Temminck and Schlegel, 1850.
- **Japanese Imp. Fish. Bur., 1904**
- **Kamiya, 1925**
- **Kishinouye, 1907**

**Cuvier and Valenciennes, 1831**

- **Description**: Cuvier and Valenciennes, 1831.
- **Günther, 1868**
- **Jordan and Herre, 1907**
- **Soldatov and Lindberg, 1930**
- **Temminck and Schlegel, 1850**
- **Distribution**: Cuvier and Valenciennes, 1831.
- **Eggs**: Kamiya, 1925.
- **Enemies**: Kishinouye, 1907.
- **Fat content**: Kishinouye, 1907.
- **Food**: Kishinouye, 1907.
- **Growth**: Kishinouye, 1907.
- **Habits**: Kishinouye, 1907.
- **Larvae**: Kishinouye, 1907.
- **Length studies**: Oku, 1904.
- **Listed from**: Japan: Kamiya, 1925.
- **Japanese Imp. Fish. Bur., 1904**
- **Kamiya, 1925**
- **Kishinouye, 1907**
- **Korea**: Mori, 1928.
- **Philippine Islands**: Seale, 1914.
- **Migration**: Kamiya, 1925.
- **Korean**: Mori, 1928.
- **Temminck and Schlegel, 1850**
- **Thompson, W. F., 1921.5**
- **Korea**: Mori, 1928.
- **Philippine Islands**: Seale, 1914.

**M'Coy, 1867**

- **Distribution**: Temminck and Schlegel, 1850.

**M'Coy, 1867**

- **Description**: Temminck and Schlegel, 1850.
- **Kishinouye, 1907**
- **Korea**: Mori, 1928.
- **Philippine Islands**: Seale, 1914.
- **Migration**: Kamiya, 1925.
- **Korean**: Mori, 1928.
- **Temminck and Schlegel, 1850**
- **Thompson, W. F., 1921.5**
- **Korea**: Mori, 1928.
- **Philippine Islands**: Seale, 1914.

**Sette, 1926.1**

- **Listed from**: Japan: Kamiya, 1925.
Kishinouye, 1907.
Sexual dimorphism
Kishinouye, 1907.
Sexual maturity
Oku, 1904.
Russo, 1925.
Sauvage, 1893.
Synonomy
Günther, 1868.
M'Coy, 1867.
Soldatov and Lindberg, 1930.
SARDINA NEOPILCHARDUS
Classification
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Description
McCulloch, 1919.
Roughly, 1916.
Stead, 1908.
Steindachner, 1879.
Waite, 1911, 1923.
Distribution
Buen, F., 1928.1.
McCulloch, 1921, 1922.
Phillips, 1925.
Regan, 1916.1.
Roughly, 1916.
Stead, 1908.
Young and Thomson, 1926.
Food
McCulloch, 1919.
Regan, 1916.2.
Roughly, 1916.
Habits
McCulloch, 1922.
Roughly, 1916.
Larvae
Regan, 1916.2.
Listed from
Australia
Chabanaud, 1926.
Common names, Australian
McCulloch, 1919.
Acloque, 1900.
Aflalo, 1901.
Blanchére, 1868.
Bloch and Schneider, 1801.
Bonnaterre, 1788.
Brunchorst, 1898.
Buckland, 1881.
Buen, F., 1929.1, 1930.
Canestrini, 1871.
Caraffa, 1902, 1929.
Carus, 1889.
Chester, 1835.
Collett, 1875, 1896.
Couch, 1867.
Cunningham, 1896, 1912.
Cuvier, 1829.
Cuvier and Valenciennes, 1831.
Day, 1879, 1880, 1883.
Devouges, 1836.
Duhamel du Monceau, 1772.
Eggs
Aflalo, 1904.2.
Arné, 1927.
Barnard, 1925.
Biétrix, 1890.
Buchanan-Wollaston, 1911.
Cunningham, 1888, 1891, 1893, 1896, 1912.
Ehrenbaum, 1909, 1927.
Fábregas-Domergue and Brunet, 1896.1, 1896.2, 1896.3.
Holt, 1897.
Holt and Scott, 1897.
Holt, 1899.
Kovarik, 1891.
Kovarik, 1892.
Kovarik, 1893.
Kovarik, 1894.
Kovarik, 1895.
Kovarik, 1896.
Kovarik, 1897.
Kovarik, 1898.
Kovarik, 1899.
Kovarik, 1900.
Kovarik, 1901.
Kovarik, 1902.
Kovarik, 1903.
Kovarik, 1904.
Kovarik, 1905.
Kovarik, 1906.
Kovarik, 1907.
Kovarik, 1908.
Kovarik, 1909.
Kovarik, 1910.
Kovarik, 1911.
Kovarik, 1912.
Kovarik, 1913.
Kovarik, 1914.
Kovarik, 1915.
Kovarik, 1916.
Kovarik, 1917.
Kovarik, 1918.
Kovarik, 1919.
Kovarik, 1920.
Kovarik, 1921.
Kovarik, 1922.
Kovarik, 1923.
Kovarik, 1924.
Kovarik, 1925.
Kovarik, 1926.
Kovarik, 1927.
Kovarik, 1928.
Kovarik, 1929.
Kovarik, 1930.
Kovarik, 1931.
Kovarik, 1932.
Kovarik, 1933.
Kovarik, 1934.
Kovarik, 1935.
Kovarik, 1936.
Kovarik, 1937.
Kovarik, 1938.
Kovarik, 1939.
Kovarik, 1940.
Kovarik, 1941.
Kovarik, 1942.
Kovarik, 1943.
Kovarik, 1944.
Kovarik, 1945.
Kovarik, 1946.
Kovarik, 1947.
Kovarik, 1948.
Kovarik, 1949.
Kovarik, 1950.
Kovarik, 1951.
Kovarik, 1952.
Kovarik, 1953.
Kovarik, 1954.
Kovarik, 1955.
Kovarik, 1956.
Kovarik, 1957.
Kovarik, 1958.
Kovarik, 1959.
Kovarik, 1960.
Kovarik, 1961.
Kovarik, 1962.
Kovarik, 1963.
Kovarik, 1964.
Kovarik, 1965.
Kovarik, 1966.
Kovarik, 1967.
Kovarik, 1968.
Kovarik, 1969.
Kovarik, 1970.
Kovarik, 1971.
Kovarik, 1972.
Kovarik, 1974.
Kovarik, 1975.
Kovarik, 1976.
Kovarik, 1979.
Kovarik, 1980.
Kovarik, 1981.
Kovarik, 1982.
Kovarik, 1983.
Kovarik, 1984.
Kovarik, 1986.
Kovarik, 1989.
Kovarik, 1990.
Kovarik, 1993.
Kovarik, 1996.
Kovarik, 1997.
Kovarik, 1999.
Kovarik, 2002.
Kovarik, 2005.
Kovarik, 2006.
Kovarik, 2008.
Kovarik, 2009.
Kovarik, 2010.
Kovarik, 2011.
Kovarik, 2012.
Kovarik, 2013.
Kovarik, 2014.
Kovarik, 2015.
Kovarik, 2016.
Kovarik, 2017.
Kovarik, 2018.
Kovarik, 2019.
Kovarik, 2021.
Kovarik, 2022.
Kovarik, 2023.
Kovarik, 2024.
Kovarik, 2025.
Kovarik, 2026.
Kovarik, 2027.
Kovarik, 2028.
Kovarik, 2029.
Kovarik, 2030.
Kovarik, 2031.
Kovarik, 2032.
Kovarik, 2033.
Kovarik, 2034.
Kovarik, 2035.
Kovarik, 2036.
Kovarik, 2037.
Kovarik, 2038.
Kovarik, 2039.
Kovarik, 2040.
Kovarik, 2041.
Kovarik, 2042.
Kovarik, 2043.
Kovarik, 2044.
Kovarik, 2045.
Kovarik, 2046.
Kovarik, 2047.
Kovarik, 2048.
Kovarik, 2049.
Kovarik, 2050.
Kovarik, 2051.
Kovarik, 2052.
Kovarik, 2053.
Kovarik, 2054.
Kovarik, 2055.
Kovarik, 2056.
Kovarik, 2057.
Kovarik, 2058.
Kovarik, 2059.
Kovarik, 2060.
Kovarik, 2061.
Kovarik, 2062.
Kovarik, 2063.
Kovarik, 2064.
Kovarik, 2065.
Kovarik, 2066.
Kovarik, 2067.
Kovarik, 2068.
Kovarik, 2069.
Kovarik, 2070.
Kovarik, 2071.
Kovarik, 2072.
Classification
Chabanaud, 1926.

Compared with herring
Lockington, 1883.

Description
Arthur, 1883.
Barnard, 1925.
Bleeker, 1853.
Castlenau, 1872.
Evermann and Radcliffe, 1917.
Gilchrist, 1909, 1913.
Goode, 1884.
Günther, 1868.
Hutton and Hector, 1872.
Jenyns, 1842.
Johnston, R. M., 1883.
Jordan and Gilbert, 1881.1, 1882.1.
Lockington, 1881.
Regan, 1916.1.
Sherrin, 1886.
Zietz, 1908.

Eggs
Barnard, 1925.

Food
Arthur, 1883.

Growth
Regan, 1916.1.

Habits
Goode, 1903.
Murphy, 1923.

Larvae
Barnard, 1925.

Listed from

Japan
Arthur, 1883.

New Zealand
Hutton, 1890, 1904. Hutton and Hector, 1872.

North America
Jordan, 1887.3.

Pacific and Indian Oceans
Black, 1913.

Pacific
Arthur, 1883.

Reproduction
Arthur, 1883.
Regan, 1916.1.

Synonomy
Abbott, 1900.
Castlenau, 1872.
Delfin, 1901.
Evermann and Radcliffe, 1917.
Gilchrist, 1913.
Günther, 1868.
Jordan and Gilbert, 1882.1.
Ogilby, 1893.
Regan, 1916.1.
SARDINA SARDINA. See Sardina pilchardus.

Authors using former name
Chabanaud, 1926.

References
126
SARDINELLA (SMALL HERRING) OF EAST COAST OF NORTH AMERICA

By-products

Weber, 1921.
Canning methods

Avard, 1918.
Weber, 1921.
Industry

Weber, 1921.
Methods of fishing

Avard, 1918.
SARDINELLA

Description

Berg, 1913.
Distribution

Berg, 1913.
Listed from New York

Bell, 1920.
Nomenclature

Berg, 1913.
SARDINELLA CAERULEUS. See Sardina caerulea.

Authors using former name

Hubbs, 1917.
Metz, 1912.
Starks and Morris, 1907.
SARDINELLA IMMACULATA

Common names, Korean

Moon, 1924.
Synonym

Korus, Moon, 1924.
SARDINELLA JUVIRE

Description

Friske, 1928.

SARDINELLA LONGICEPS

Description

Hendel and Nagai, 1914.
Fat content

Hendel and Nagai, 1914.
Hendel and Kimura, 1914.
Migrations

Hendel, 1910.
Paratypes

Hendel and Nagai, 1914.
Preservation methods

Masuda, 1910.
Races

Hendel and Nagai, 1914.
Regressions

Hendel, 1910.
Hendel and Nagai, 1914.
Studer

Hendel and Nagai, 1914.
SARDINELLA MACROPHthalmUS

Description

Breder, 1929.

SARDINELLA PSEUDOHISPANICA. See Sardina pseudohispanica.

Authors using former name

Evermann and Radcliffe, 1917.
Jordan, 1905.
Murphy, 1923.
SARDINELLA SAJAX. See Sardina sajax.

Authors using former name

Evermann and Radcliffe, 1917.
Jordan, 1905.
Starks, 1913.
SARDINELLA SARDINA

Color

Meek and Hildebrand, 1923.
Description

Breder, 1929.
Meek and Hildebrand, 1923.
Starks, 1913.
Distribution

Breder, 1929.
Figured

Breder, 1929.
Latin

Breder, 1929.
Linked from Brazil

Starks, 1913.
Synonym

Meek and Hildebrand, 1923.
SARDINELLA SIMA

Coloration

Cox, Land and Scott, 1906.
Description
Fowler, 1928.

Listed from Samoa
Jordan and Seale, 1906.

Synonomy
Fowler, 1928.

SARDINELLA STOLIFERA
Abundant off Mexico
Jordan, Starks, Culver and Williams, 1895.

SARDINELLA TOLI
Listed from Formosa
Jordan and Richardson, 1909.

SARDINELLA ZUNASHI
Common names, Korean
Mori, 1928.

Mori, 1928.

SARDINIA.
See Sardina.

SARDINOPS
Proposed as generic name of California sardine
Hubbs, 1929.

SCALES
Number of, in Sardina pilchardus
Bateson, 1890, 1894.

Study of
Arné, 1928.1, 1928.2.


Buen, F., 1919.3, 1924, 1925.

Buen, R., 1927.

Cockerell, 1914, 1915.

Hjort, 1913.

Hornell and Nayudu, 1924.

Le Gall, 1930.

Meek, 1916.

Navarro, 1926.

Ramalho, 1927.

Ramalho and Boto, 1930.

Steuer, 1908.

Storrow, 1915.

Thompson, W. F., 1926.1.

SCIENTIFIC INVESTIGATIONS

British Columbia
British Columbia Comm. Fish., 1930, 1931.

Canadian Fish., 1929.2, 1929.3.

California
Andrews, 1928.

Bryant, 1924.

Calif. Fish Game, 1922.1.

Chute, 1930.

Clark, F. N., 1928, 1930.2.

Higgins, 1920, 1923, 1926.

Pacific Fish., 1918.5, 1927.2.

Scofield, E. C., and Lindner, 1930.

Scofield, N. B., 1921.1, 1923.1.

Scofield, W. L., 1927.

Sette, 1920, 1926.1.

Thompson, R. M., 1927.


Thompson, W. F., and Edser, 1929.

Thompson, W. F., and Higgins, 1920.

West Coast Fish., 1929.3, 1930.4.

England
England Bd. Ag. Fish., 1913.

Europe
Allen, E. J., 1922.

Thoulet, 1913.

France
Anthony, 1909.

Bénard, 1903.

Pouchet, 1887.2, 1887.3, 1889.2.

Roché, 1893.3, 1894.1.

Scotland Fish. Bd., 1892.

Smith, W. A., 1892.

Spain
Instructions for
Buen, F., 1919.1.

SEXUAL DIMORPHISM
Sardina caerulea
Scofield, W. L., 1926.2.

Sardina melanosticta
Kishinouye, 1907.

Sardina pilchardus
Belloc, 1930.

Belloc and Desbrosses, 1930.

Bounhiol, 1913.2, 1919.2.


Buen, O., 1916.

Buen, R., 1927.

Cornish, 1881.

Cunningham, 1892.3, 1896, 1912.


Le Danois, 1930.

Macon, 1888.

Marsden and Bevers, 1918.


Radcliffe, 1921, 1923.1, 1923.2.

Scofield, N. B., 1921.1, 1927.


Sette, 1925, 1927, 1928, 1929.

Smith, H. M., 1896.

Taylor, 1924.

Terry, 1929.

Thompson, W. F., 1922, 1926.1.

128
“TERRE ROUGE” USED IN SALTING SARDINES
Athanassopoulos, 1925.

UNLOADING OF FISH
Scofield, N. B., 1929.

USES, UNUSUAL
In general
Mitchell, 1883.
In heraldry
Clark, 1867.
In witchcraft
Tsuda, 1917.

VERTICAL DISTRIBUTION
Bounhiol, 1917; 1919.1, 1924.
Buen, F., 1927.4.
Russell, F. S., 1926.

WEATHER—EFFECT ON FISHERY
Bounhiol, 1917.2.

WEIGHT-LENGTH RELATIONSHIP
Sardina caerulea
Clark, F. N., 1928.
Sette, 1926.1.
Thompson, W. F., 1926.1.

Sardina melanosticta
Oku, 1904.

Sardina pilchardus
Buen, F., 1927.4, 1929.2.

Le Gall, 1910.2.