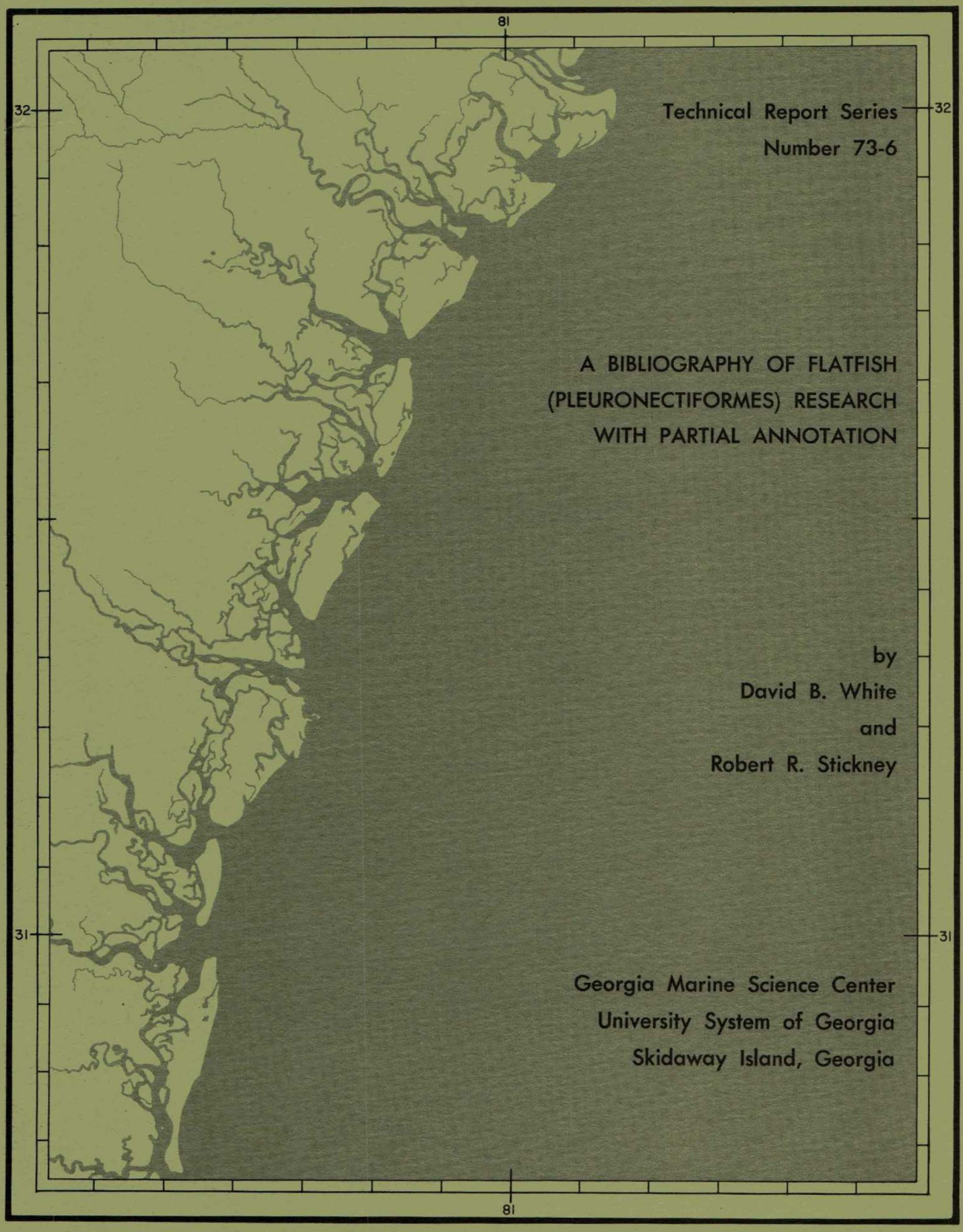

Technical Report Series
Number 73-6

A BIBLIOGRAPHY OF FLATFISH (PLEURONECTIFORMES) RESEARCH WITH PARTIAL ANNOTATION

by
David B. White
and
Robert R. Stickney

Georgia Marine Science Center
University System of Georgia
Skidaway Island, Georgia

A BIBLIOGRAPHY

OF FLATFISH (PLEURONECTIFORMES) RESEARCH

WITH PARTIAL ANNOTATION

by

David B. White

and

Robert R. Stickney

Skidaway Institute of Oceanography
P.O. Box 13687
Savannah, Georgia 31406

September 1973

The Technical Report Series of the Georgia Marine Science Center is issued by the Georgia Sea Grant Program and the Marine Extension Service of the University of Georgia on Skidaway Island (P.O. Box 13687, Savannah, Georgia 31406). It was established to provide dissemination of technical information and progress reports resulting from marine studies and investigations mainly by staff and faculty of the University System of Georgia. In addition, it is intended for the presentation of techniques and methods, reduced data and general information of interest to industry, local, regional, and state governments and the public. Information contained in these reports is in the public domain. If this prepublication copy is cited, it should be cited as an unpublished manuscript.

FOREWORD

The following Annotated Bibliography represents an extensive search of the literature on the order Pleuronectiformes. Emphasis in this bibliography has been placed on papers dealing with culture procedures, physiological requirements, nutrition, growth, feeding habits and other subjects which we feel would be of interest to scientists working with this group of animals in the laboratory and to scientists and the lay public interested in rearing Pleuronectiform fishes under aquaculture conditions. A considerable number of references dealing with catch records and incidences of occurrence have been omitted since this information is usually available locally and is not of great importance to the topics under consideration. For convenience, all contributions have been cross indexed by subject and species and are listed in order by author.

The authors wish to thank Mrs. Jennet White and Mrs. Barbara McNair for their assistance in typing the manuscript. This work was carried out in conjunction with the ongoing research at the Skidaway Institute of Oceanography, funded by the Sea Grant Office of the National Oceanic and Atmospheric Administration under Grant Number 1-36009.

A manual of flatfish rearing techniques which will summarize the most useful information from the papers included herein and which is supplemented by data collected at the Skidaway Institute of Oceanography is now in preparation.

ANNOTATED BIBLIOGRAPHY

1. Ackman, R. G. and P. J. Ke. 1968. Commercial redfish and flatfish (flounder) oils: Comparative features of fatty acid composition. J. Fish. Res. Bd. Can. 25(5): 1061-1065.

Pseudopleuronectes americanus

2. Agassiz, A. 1879. On the young stages of some osseous fishes. II. Development of the flounders. Proc. Am. Acad. Arts Sci. 14: 1-25.

3. Ali, M., M. Anctil, and H. M. Mohideen. 1968. Structure retinienne et la vascularisation intraculaire chez Quelques Poissons marins de la region de Gaspe. Can. J. Zoo. 46(4): 729-745.

Hippoglossus platessoides
Hippoglossus hippoglossus
Pseudopleuronectes americanus
Reinhardtius hippoglossoides

Describes the retinal structure, intraocular circulation, activity and habitat of the above species of flatfish and several other marine teleosts.

4. Allen, K. R. and C. R. Forrester. 1966. Appropriate size limits for lemon sole (Parophrys vetulus) in the Strait of Georgia. J. Fish. Res. Bd. Can. 23(4): 511-520.

5. Amoaka, K. 1964. First record of sinistrality in Polciopsetta plinthus (Jordan and Starks) a pleuronectid fish of Japan. Bull. Misaki Mar. Biol. Inst. Kyoto Univ. 7: 9-17.

6. _____. 1964a. Development and growth of the sinistral flounder, Bothus myriaster, (Temminck and Schlegel) found in the Indian and Pacific Oceans. Bull. Misaki Mar. Biol. Inst. Kyoto Univ. 5: 11-29.

7. Anderson, W. W. and E. J. Gutherz. 1967. Revision of the flatfish genus, Trichopsetta (Bothidae) with descriptions of three new species. Bull. Mar. Sci. 17(4): 892-913.

8. Andriyashev, A. P. 1960. Families of fish new to Antarctica. Communication 3. Pelagic fry of the flatfish (Pisces, Bothidae) off the coast of Antarctica. (English summary) Zool. Zhur. 39(7): 1056-1061.

9. Anonymous. 1968. Marine Biological Ass. of U. K. Report of the Council for 1967-1968. Mar. Biol. Ass. U. K. 48(3): 837-868.

10. Anthony, R. 1907. La poscifacture du turbot au laboratoire maritime du Museum (St. Vaast-la-Hougue). Bull. Mus. Hist. Nat., Paris, 13: 557-559.

11. _____. 1910. The cultivation of the turbot. Bull. U.S. Bur. Fish. 28, 1908(2): 861-870.

Rhombus maximus

Review of literature on culture of turbot. Very early rearing techniques. Plates of egg and larval development.

12. Arnold, G. P. 1969. The reactions of the plaice (Pleuronectes platessa L.) to water currents. J. Exp. Biol. 51(3): 681-697.

At a threshold current velocity of .8-8 cm/sec., 2-28 cm plaice oriented themselves head upstream-the most streamlined position as shown by flow observations. With increased velocity, a posterior fin beating response was noted which ejected water penetrating beneath the fish.

13. Bagenal, T. B. 1960. The fecundity of plaice from the south and west coasts of Ireland. J. Mar. Biol. Ass. U.K. 39: 255-262.

Pleuronectes platessa

Summary of data from four previous papers (6 locations). Results indicate that plaice return to an hereditary spawning area and that food abundance heavily influences fecundity of plaice.

14. _____. 1966. The ecological and geographical aspects of the fecundity of the plaice. J. Mar. Biol. Ass. U. K. 46: 161-186.

Pleuronectes platessa

Discussed distribution of plaice and summarizes all of his earlier papers on this subject to be related to food availability.

15. Barr, W. A. 1963a. The endocrine control of the sexual cycle in the plaice, Pleuronectes platessa I. Cyclic changes in the normal ovary. Gen. & Comp. Endocrinol. 3(3): 197-204.

Pleuronectes platessa

Techniques for pituitary gland removal and force feeding resulting in good post operative survival are given. Ovarian histology and its cyclic changes are discussed.

16. _____. 1963b. The endocrine control of the sexual cycle in the plaice, Pleuronectes platessa (L) II. The endocrine control of oogenesis. Gen. & Comp. Endocrinol. 3(3): 205-215.

Pleuronectes platessa

Oviposition in plaice is stimulated by ingestion of plaice pituitary gland extract as well as other gonadotropins.

17. _____. 1963c. The endocrine control of the sexual cycle in the plaice, Pleuronectes platessa (L) III. The endocrine control of spermatogenesis. Gen. and Comp. Endocrinol. 3(3): 216-225.

Spermatogenesis is inhibited when fish are hypophysectomized prior to initiation of testes development, but once the process has started, evidence suggests it may continue for some time despite hypophysectomization.

18. _____. and B. M. Hobson. 1964. Endocrine control of the sexual cycle in the plaice, Pleuronectes platessa (L) IV. Gonadotropic activity of the pituitary. Gen. & Comp. Endocrinol. 4(6): 608-613.

Unable to demonstrate the type of gonadotropin in the plaice pituitary.

19. Barsukov, V. 1962. Replacement of teeth in fish. Rybovodstvo i Rybolovstvo 4: 25-28.

20. Bearden, C. M. 1960. Flounder and their cousins unique fish. South Carolina Wild. Dept. Ed. Release 177: 6pp.

21. _____. 1971. Occurrence of juvenile broad flounder, Paralichthys squamilentus, in South Carolina coastal waters. Copeia 1971(4): 729-730.

22. Beardsley, A. J. and H. F. Horton. 1965. An ambicolored starry flounder from Yaquina Bay, Oregon. Calif. Fish Game. 51(2): 126-128.

Platichthys stellatus

23. Berry, R. J. 1959. Critical growth studies of winter flounder, Pseudopleuronectes americanus (Walbaum) in Rhode Island waters. M.S. dissertation U. of R. I.

24. _____, S. B. Saila and D. B. Horton. 1965. Growth studies of winter flounder, Pseudopleuronectes americanus (Walbaum) in Rhode Island. Trans. Am. Fish. Soc. 94(3): 259-264.

A new technique for growth estimates from catch data was developed, growth and mortality rates for each sex were determined.

25. Best, E. A. 1963. Movements of petrale sole, Eopsetta jordani (Lockington), tagged off California. Pacific Mar. Fish. Comm. Bull. 6: 24-38.

26. Beverton, R. J. H. 1960. Farming the sea. Fish. Tr. Gaz. No. 4022: 16-20.

27. Bigelow, H. B. and W. C. Schroeder. 1953. Fishes of the Gulf of Maine. Fishery Bulletin of the Fish and Wildl. Ser. Vol. 53, Fishery Bull. #74: 577 pp.

28. Birkett, L. 1969. The nitrogen balance in plaice, sole and perch. J. Exp. Biol. 50(2): 375-386.

Pleuronectes platessa
Solea solea

Plaice and sole were fed live foods and the total amount of nitrogen was balanced between maintainence, growth and excretion.

29. Bishai, H. M. 1960a. The effect of gas content of water on larval and young fish. Z. wiss. Zool. 163: 37-64.

Pleuronectes platessa

Resistance to water of low O_2 content decreases with age due to mode of respiration, carbohydrate content and to the increased activity of the growing larvae. Fish at all stages can survive 300% saturation if the total gas pressure does not exceed hydrostatic pressure.

30. _____. 1960b. The effect of hydrogen ion concentration on the survival and distribution of larval and young fish. Z. Wiss Zool. 164: 107-108.

Pleuronectes platessa

Lower limiting pH level is 6.1-6.5.

31. _____. 1960c. The effect of salinity on the survival and distribution of larval and young fish. J. Cons. Int. Explor. Mer. 26(1): 166-179.

Pleuronectes platessa

Temp. 16.8C, pH 8.1-7.7; showed that 38-50 mm plaice can survive at least 10 days at 5 p.p.t.; 5 days at 3-4 p.p.t. and 20 hours at 0 p.p.t.

32. Blaxter, J. H. S. 1968. Light intensity, vision, and feeding in young plaice. J. Exp. Mar. Biol. Ecol. 2: 293-307.

Pleuronectes platessa

Showed plaice to be visual feeders and dependent primarily upon light. With age plaice feed with lower levels of light. At metamorphosis require .01 meter candles of light to feed, although there is some feeding in dark apparently due to some other sense. Food - Artemia nauplii.

33. _____. 1969. Visual thresholds and spectral sensitivity of flatfish larvae. J. Exp. Biol. 51(1): 221-230.

Pleuronectes platessa
Solea solea

Plaice and sole larvae have purecone retinae and no retinomotor responses. Light intensity thresholds for feeding ranged from 10^{0} to 10^{-2} m.c. with negative photoaxis occuring at 10^{-4} to 10^{-6} m.c. Sensitivity to light increased with age.

34. Blegvad, H. 1951. Propagation and transplantation of marine fish. Proc. U.N. Sci. Conf. on the Conservn. and Utilizn. of Res., Lake Success, 1949, 7: 51-57.

35. Bohlke, J. E. 1961. Two new Bahaman soles of the genus Symphurus (family Cynoglossidae), Notulae Naturae (Philadelphia) 344: 1-4.

First recordings of S. ommaspilus and S. rhytisma are in the Bahamas.

36. Borley, J. O. 1923. The plaice fishery and the war. Prelim. report on investigations. Fish. Invest. Lond. Ser. 2. 5(3): 56 pp.

37. Bowers, A. B. 1960. Growth of the witch (Glyptocephalus cynoglossus L.) in the Irish Sea. J. Cons. Perma, Int. Explor. Mer. 25: 168-176.

38. Boyer, R. A. and G. E. Morrison. 1971. Factors affecting the respiration rates of winter flounder (Pseudopleuronectes americanus). J. Fish Res. Bd. Can. 28(12): 1907-1911.

Pseudopleuronectes americanus (Winter flounder)

Effect of temperature, maintenance in reduced oxygen environment and weight of fish on oxygen consumption.

39. Braaten, B., E. E. Mollerud and P. Solemdal. 1972. The influence of some byproducts from vinychloride production on fertilization, development and larval survival of plaice, cod and herring eggs. Aquaculture 1(1): 81-90.

Pleuronectes platessa

Concentrations of by-products of vinylchloride production of 50 and 100 ppm delay or stop development of plaice eggs in an early stage.

40. Bratland, P. and P. Solemdal. 1972. Selective breeding of marine fish I. Automatized feeding of pelagic fish larvae under controlled environmental conditions. Aquaculture 1(1): 75-79.

Pleuronectes platessa

An automatized feeding apparatus (for Artemia) is described which causes a decrease in the time needed for metamorphosis.

41. Breder, C. M. Jr. 1923. Some embryonic and larval stages of the winter flounder. U.S. Bur. Fish. Bull. for 1921-1922 vol 38: 311-316.

Pseudopleuronectes americanus

42. Bregnballe, F. 1961. Plaice and flounder as consumers of the microscopic bottom fauna. Meddel. Danmarks Fisk. - of Havundersog. Ny Ser. 3(6): 133-182.

Young Pleuronectes platessa and P. flesus stomachs were examined after feeding in shallow waters.

43. Brice, J. J. 1898. A manual of fish-culture, based on the methods of the United States Commission of Fish and Fisheries, Rep. U. S. Comm. Fish. 1897. Appendix. 1-340.

Pseudopleuronectes americanus

Early culturing techniques of winter flounder.

44. Briggs, P. T. 1965. The sport fisheries for winter flounder (Pseudopleuronectes americanus) in several bays of Long Island. N.Y. Fish and Game J. 12(1): 48-70.

45. Brooke, R. O., E. M. Ravesi and M. A. Steinberg. 1962. The composition of commercially important fish taken from New England waters. II Proximate analysis of butterfish, flounder, pollock, and hake and their seasonal variation. J. Food Sci. 27(1): 73-76.

    Protein, oil, ash, moisture, Na and K content of several fish were determined.

46. Budd, P. L. 1940. Development of the eggs and early larvae of six California fishes. Calif. Dept. Nat'l. Res. Div. of Fish and Game Fish. Bull. 56: 50 pp.

    Parophrys vetula
    Pleuronichthys verticalis
    Pleuronichthys decurrens
    Pleuronichthys coenosus

47. Bulger, R. E. and B. F. Trump. 1969. A mechanism for rapid transport of colloidal particles by flounder renal epithelium. J. Morphol 127(2): 205-224.

    After injection of tracer colloidial particles into tubular lumen of flounder, large invaginations containing these particles were noted. This transport might explain the type of protein transport noted by Maack and Kinter (1969).

48. Buller, R. J. 1951. Fishery survey of southern coastal waters. U.S. Fish Wildl. Ser. Spec. Sci. Rep. Fish. 58: 19 pp.

    Otter trawling was conducted during the early summer primarily off the North Carolina coast in 20 to 150 fathoms. All species caught were recorded. 10 species of flatfish of the genuses Ancylopsetta, Syacium, Citharichthys, Monolene, Paralichthys, Hippoglossina and Cyclopsetta were recorded.

49. Burfield, S. T. 1928. The absorption of oxygen by plaice eggs. J. Exp. Biol. 5: 177-184.

    Pleuronectes platessa

    Respiratory quotient of plaice egg = .75. Rate of O_2 absorption by plaice egg falls over time in a static system and probably is controlled by CO_2 carbonate system of seawater.

50. Chang, H., G. Xo and X. Sha. 1965. A description of the important morphological characters of the eggs and larvae of two flat fishes, Paralichthys olivaceous (T. and S.) and Zebrias zebra (Bloch). Oceanol. Limnol. Sinica (Peking) 7(2): 158-180. In Chinese-English abstract.

51. Chepurnov, V.S., M.S. Burnaskev, Y.I. Dimitriev, and T.G. Lazur'evskaya. 1962. Daily ration and daily feeding rhythm of young flounders (Pleuronectes flesus) in the Shabolat estuary. Referat. Zhur. Biol., 1963. No. 12148 (Translation).

    Daily stomach content of P. flesus varied from 5.0 - 5.7% of body weight. Polychaetes form over $\frac{1}{2}$ of food, feeding is during light hours; feeding rhythm has 3 peaks with 2 to 6 hour intervals.

52. Chinarina, A.D. 1961. Changes in the coloration of marine flounders (Platessa platessa L.) and Capelin (Mallolus villosus villosus Muller) under experimental conditions. Doklady Akad. Nauk SSSR (Biol. Sci. Sect. Transl.) 135(1/6): 996-998.

    Platessa platessa
    Mallolus villosus villosus

    Color changes in flounder depend on background, not biological environment.

53. Christensen, J.M. 1964. Burning of otoliths, a technique for age determination of soles and other fish. J. Cons. Int. Ex. Meer. 29: 73-81.

    Solea solea

    A procedure for reliable age determination in flatfish was developed. Previous procedures gave poor results.

54. Chuinard, R.G., S.R. Wellings, H.A. Bern and R. Nishoika. 1964. Epidermal papillomas in pleuronectid fishes from the San Juan Island, Washington. In 48th Annual meeting of the Federation of American Societies for Experimental Biology, 1964. Fed. Proc. 23(2pt1) 337. Abstract only.

55. Cieglewicz, W. 1960. Composition of the Polish Flounder catches in the southern Baltic in 1960. Ann. Biol. 17: 116-117.

56. Coates, P.G., A.B. Howe and A. E. Peterson Jr. 1970. Analysis of winter flounder tagging off Massachusetts, 1960-1965. Dept. Nat'l. Res. Div. Mar. Fish. Report: 47pp.

Over 12,000 P. americanus were tagged off Massachusetts from 1960-1965. Returns totaled over 4,000. Rising temperature causes an offshore migration during the summer followed by a return to inshore areas during the fall spawning season. Estimated population density was 6 to 10 lbs. per acre.

57. Colman, J.A. 1970. On the efficiency of food conversion of young plaice (Pleuronectes platessa). J. Mar. Biol. Ass. U.K. 50: 113-120.

Pleuronectes platessa

Plaice required 5 gms (wet weight) chopped mussel to gain 1 gm (wet weight).

58. Colton, J.B. Jr. 1961. The distribution of eyed flounder and lantern-fish larvae in the Georges Bank area. Copeia 1961(3): 274-279.

Bothus ocellatus

59. Corkum, K.C. 1961a. A new species of Bucephaloides (Trematoda: Bucephalidae) from the southern flounder of the Louisiana Coast. J. Parasitol. 47(2): 231-232.

60. _____. 1961b. A new species of trematode, Phillodistomum trimenectes from a flatfish of the Louisiana coast. Trans. Am. Microsc. Soc. 80(3): 370-373.

Found in bladder of Trinectes maculatus.

61. _____. 1966. The digenetic trematodes of some flatfishes from Barataria Bay, Louisiana. Proc. Louisiana Acad. Sci. 29(1): 45-51.

Trinectes maculatus, Paralichthys lethostigma and Symphurus plaguisa all were infected with trematodes.

62. Corlett, D.A. Jr. 1965. Application of replica plating and computer analysis for rapid identification of bacteria in some foods. II. Analysis of microbial flora in irradiated sole (Microstomus pacificus). Appl. Microbiol. 13(5): 818-822.

Spoilage of untreated samples was caused primarily by Pseudomonas; irradiation caused a shift to growth of Achromobacter and yeasts.

63. Cowey, C.B., J.W. Adron, A. Blair and F. Pope. 1970. The growth of O-group plaice on artificial diets containing different levels of protein. Helgolander Wess. Meer. 20: 602-609.

Pleuronectes platessa

O-group plaice grown on artificial diets with different levels of protein increased linearly with protein content to highest level of 70%. Results indicate that plaice require extremely high amounts of protein compared to other fishes.

64. _____, J. Adron and A. Blair. 1970 Studies on the nutrition of marine flatfish: The essential amino acid requirements of plaice and sole. J. Mar. Biol. Ass. U.K. 50: 87-95.

Pleuronectes platessa
Solea solea

65. _____, J.A. Pope, J.W. Adron and A. Blair. 1971. Studies on the nutrition of marine flatfish. Growth of the plaice, Pleuronectes platessa, on diets containing proteins derived from plants and other sources. Mar. Biol. 10: 145-153.

Indicated that at least part of plaice high protein requirements can be filled by plant protein or single cell protein concentrate when supplemented with certain amino acids. Poor results using fish protein concentrate or soyabean meal.

66. Cunningham, J.T. 1894. Experiments on the rearing of fish larvae in the season of 1894. J. Mar. Biol. Ass. U.K. 3: 206-207.

67. Cushing, D.H. 1968. Fisheries biology, A study in population dynamics. the U. of Wiscon. Press. Madison. 200 pp.

68. Dahl, K. 1909. The problem of sea fish hatching. Rapp. Cons. Explor. Mer. 10. B(5): 1-39.

69. Dannevig, A. 1947. The Flødevigen sea fish hatchery at Arendal, Norway. J. Cons. Int. Explor. Mer. 15: 7-12.

70. _____. 1948. Rearing experiments at the Flødevigen sea fish hatchery, 1943-1946. J. Cons. Int. Explor. Meer. 15(3): 277-283.

Pleuronectes platessa
Solea vulgaris
P. flesus

Briefly summarizes work done by H.C. Dannevig, Fabre-Doumergue and Rollefsen, as well as his own work at Flødevigen, Norway.

71. _____. 1950. The influence of the environment on the number of vertebrae in plaice. Fisk. Skr. Havundersøk. (9): 1-6.

72. _____ and G. Dannevig. 1950. Factors affecting the survival of fish larvae. J. Cons. Int. Explor. Mer. 16: 211-215.

Pleuronectes platessa

Describes a "gas disease" that kills fish probably by supersaturation of the water by nitrogen.

73. Dannevig, G.M. 1910 Apparatus and methods employed at the marine fish hatchery at Flødevigen, Norway. Proceedings of the 4th International Fishery Congress, Washington, 1908, Pt. 2. Published as Bull. U.S. Bur. Fish. 28: 801-809.

74. _____. 1910 The utility of sea-fish hatching. Proceedings of the 4th International Fishery Congress, Washington, 1908, Pt. 2. Published as Bull. U.S. Bur. Fish. 28: 813-816.

75. _____ and K. Dahl. 1907. Artificial fish-hatching in Norway. Rep. Lancs. Sea-Fish. Labs. 1906: 104-125.

76. Dannevig, H. 1897. On the rearing of the larval stages of the plaice and other flatfishes. Fish. Bd. Scot. 15th Ann. Rep., 1896. Pt. 3: 175-193.

77. _____. 1898. Report on the operations at the Dundee Marine Hatchery for the period July 1896 to December 1897 with notes on the rearing of flat fishes. 16th Ann. Report of the Fish. Bd. for Scotland. 3(7): 219-225.

78. _____. 1899. On the rate of growth of plaice. 17th Ann. Report of the Fish. Bd. for Scotland. 3: 232-247.

79. _____. 1902. On the first successful experiment with importation of European sea fishes to Australian waters. Rep. Dep. Fish. N.S.W. 1902. 2: 5-17.

80. Davis, W.P. 1970. Closed systems and the rearing of fish larvae. Helgolander wiss Meeresunter. 20: 691-696.

81. Dawes, B. 1930. Growth and maintenance in the plaice (Pleuronectes platessa L.) I. Mar. Biol. Assoc. U.K. 17: 103-174.

82. _____. 1931a Growth and maintenance in the plaice (P. platessa L.) II. J. Mar. Biol. Assoc. U.K. 17: 877-947.

83. _____. 1931b A statistical study of growth and maintenance in the plaice (Pleuronectes platessa L.) J. Mar. Biol. Assoc. U.K. 17: 949-975.

84. Dawson, C.E. 1968a Contributions to the biology of the Mexican flounder, Cyclopsetta chittendeni, in the Northern Gulf of Mexico. Trans. Am. Fish. Soc. 97(4): 504-507.

85. _____. 1968b Meristic and morphometric data on the flatfish, Citharichthys gilberti from Panama. Gulf Res. Rep. 2(3): 325-329.

86. DeGroot, S.J. and A. Schuyf. 1967. A new method for recording the swimming activity in flatfishes. Experientia 23(7): 574-576.

Nycthemeral rhythms in Pleuronectiform fish can be monitored by recording induction voltage produced by a flatfish with a permanent magnet swimming into a coil.

87. _____. 1971. On the interrelationships between morphology of the alimentary tract, food and feeding behavior in flatfish (Pisces: Pleuronectiformes). Netherlands J. of Sea Res. 5(2): 121-196.

Representatives of five families of Pleuronectiformes were used. Using all available information the fishes were able to be divided into three behavioral groups depending on feeding habits. Excellent literature review on flatfish feeding behavior.

88. Demory, R. L. 1971. Depth distribution of some small flatfishes off the northern Oregon-southern Washington coast. Res. Rep. Fish Comm. Oreg. 3:44-48.

89. Deubler, E. E., Jr. 1958. A comparative study of the postlarvae of three flounder (Paralichthys) in North Carolina. Copeia. 1958(2): 112-116.

Paralichthys dentatus
P. lethostigma
P. albigutta

Key to distinguish these three species at late postlarval development.

90. _____. 1960. Salinity as a factor in the control of growth and survival of postlarvae of the southern flounder, Paralichthys lethostigma. Bull. Marine Sci. Gulf and Carib. 10(3):338-345.

Paralichthys lethostigma

Temp. 15°C., photoperiod 10 hr. dark - 8 hr. light, Results indicated acclimatization not necessary. Results indicated that increased salinities up to 30 o/oo caused increased growth. Food - Artemia nauplii.

91. _____ and W. E. Fahy. 1958. A reversed ambicolorate summer flounder, Paralichthys dentatus. Copeia. 1958(1):55.

92. _____ and J. C. White. 1962. Influence of salinity on growth of postlarvae of the summer flounder, Paralichthys dentatus. Copeia 2: 468-469.

Paralichthy dentatus

Growth rate increased as salinity increased over range 10 o/oo to 30 o/oo lost weight in 40 o/oo salinity water. Water temp. 14°C. Photoperiod 16 hrs. dark. Food - Artemia nauplii.

93. _____ and G. S. Posner. 1963. Response of postlarval flounder, Paralichthys lethostigma, to water of low oxygen concentrations. Copeia. 2:312-317.

P. lethostigma withdraws from water with less than 3.7 ml/l dissolved O_2. When possible acclimatization of 2 weeks at about 13°C. and 31 o/oo salinity.

94. Edwards, D.J. 1971. Effect of temperature on the rate of passage of food through the alimentary canal of the plaice, Pleuronectes platessa L. J. Fish. Biol. 3(4): 433-439.

Using x-ray and barium sulfate as an indicator, exponentially negative correlation was found between temperature and hours until stomach evacuation of food.

95. Edwards, R.R.C. 1967. Estimations of the respiratory rate of young plaice (Pleuronectes platessa) in natural conditions using zinc-65. Nature (London) 216(5122): 1335-1337.

Estimated respiratory rates and Zn-65 elimination rate for plaice were calculated at different temperatures and feeding levels using a closed system respirometer.

96. _____ and J.H. Steele. 1968. The ecology of O-group plaice and common dabs at Loch Ewe. I. Population and food. J. Exp. Mar. Biol. Ecol. 2: 215-238.

Pleuronectes platessa
Limanda limanda

97. _____, D.M. Finlayson and J.H. Steele. 1969. The ecology of O-group plaice and common dabs in Loch Ewe. II. Experimental studies of metabolism. J. Exp. Mar. Biol. Ecol. 1969. 3: 1-17.

Pleuronectes platessa
Limanda limanda

Determined respiration rate of O-group plaice and dabs of different weights and temperatures.

98. _____, J.H. Steele and A. Trevallion. 1970. The ecology of O-group plaice and common dabs in Loch Ewe. III. Prey-predator experiments with plaice. J. Exp. Biol. Ecol. 4(2): 156-173.

Plaice feeding on siphons of Tellina tenuis in outdoor tanks were studied. Relations between growth rate, matabolic rate and food supply are deduced for the seminatural conditions.

99. _____, J.H.S. Blaxter, U.K. Gopalan, C.V. Mathew and D.M. Finlayson. 1971. Feeding, metabolism and growth of tropical flatfish. J. Exp. Mar. Biol. Ecol. 6(3): 279-300.

Growth, feeding and metabolism was recorded for 5 species of Cynoglossus, a species of Brachirus and a species of Synaptura from the southwest coast of India.

100. _____. 1971. An assessment of the energy cost of gill ventilation in the plaice (Pleuronectes platessa L.) Comp. Biochem. Physiol. 40 (2A): 391-398.

101. Eisler, R. 1963. Partial albinism and ambicoloration in winter flounder, Pseudopleuronectes americanus. Copeia. 2: 275-277.

Discusses abnormal pigmentation of two winter flounder.

102. El-Zarka, S. 1963. Acclimatization of Solea vulgaris (Linnaeus) Quarum, Egypt. J. Cons. 28(1): 126-136.

103. Engstrom, K. and I. Aklbert. 1963. Cone types and cone arrangement in the retina of some flatfishes. Acta. Zool. 44($\frac{1}{2}$): 119-129.

Hippoglossoides platessoides
Solea solea
Pleuronectes platessa

104. Ernst, W. 1970a. Metabolism of pesticides in marine organisms: III. Degradation and accumulation of DDT - ^{14}C in flatfish, Solea solea, in short-term studies. Veroff. Inst. Meer. Brem. 12(3): 361-364. (English summary).

Nine days after administration of single oral doses of DDT (1.89.0 μg), up to 10% of the total dose was degraded to DDD and to a lesser extent DDE. Brain concentrations of DDT was 5 times higher than in whole fish at all dose levels.

105. _____. 1970b. Metabolism of pesticides in marine organisms: II. Biotransformation and accumulation of DDT -^{14}C in flatfish, Platichthys flesus. Veroff. Inst. Meer. Brem. 12(3): 353-360. (English summary).

Daily 1-2 μg oral doses of DDT-^{14}C resulted in accumulation in various body tissue in the ppm range. DDD and DDE were observed in various tissues.

106. Ewart, J.C. 1885. Report on the progress of fish culture in America. Rep. Fish. Bd. Scot. 1884. Appendix F. No. 8: 78-91.

107. Fabre-Domergue, P. and E. Bietrix. 1905. Developpement de la Sole (Solea vulgaris). Travail du. Laboratoire de Zoologie Maritime de Concarneau. 243 pp. Buibert et Nony, Paris.

108. Fadeev, N.S. 1960. List of flounders of the continental shallow of the South Sakhalin shore and their biological characteristics in brief. Voprosy ikhliologii (Moscow) 13: 26-34. Referat. Zhur. Biol., 1960, No. 66295 (Translation).

109. _____. 1961. Biological features of flatfish. Priroda 3: 113.

Lepidopsetta bilineata were found off the bottom .5 to 1 meter from the surface. Depth was 40-45 m in this location. Benthic and pelagic organisms were found in stomachs of these fishes.

110. _____. 1963. Economic and biological characteristics of the yellowfin sole (Limanda aspera) from Southern Sakhalin. Referat. Zhur. Biol., 1963, No. 221107 (Translation).

Most widely distributed and abundant Pleuronectidae in the western Pacific. Describes spawning and general life history.

111. Fedorov, A.F., V.N. Podymakhin, N.T. Shchitenko, and V.V. Chumachenko. 1964. Effect of slight radioactive contamination of water on the development of plaice (Pleuronectes platessa L. Vop. Ikhtiol. 4(3): 579-585.

$Sr^{90} + Y^{90}$ at 4.3×10^{-10} and 4.3×10^{-11} curies/l. and Cs^{137} at 5.4×10^{-10} curies/l. caused significant mortalities and increased the incidence of malformations 4 to 5 times over controls.

112. Fletcher, A.M. 1968. Unusual aquarium fishes. J.B. Lippincott Co. Philadelphia, N.Y. 144pp.

Structure and behavior of pleuronectiformes.

113. Fluchter, J. 1965. Experiments on raising offspring of the sole, Solea solea (L.) in small aquaria. Helg. Wiss. Meer. Sunt. 12(4): 395-403.

113. Continued

Method for mass culture of Artemia salina is described and the spawning and development of sole in the laboratory is included.

114. Follet, W.E. 1954. The case of the piebald flounder. Pacif. Dis. 7(5): 24-25.

115. _____, R.B. McCormick and E.A. Best. 1960. First records of sinistrality in Microstomus pacificus (Lockington) and Glyptocephatus zachirus (Lockington), pleuronectid fishes of western North America, with meristic data. Copeia 1960(2): 112-119.

116. Forrester, C.R. 1964a. Rate of development of eggs of rock sole (Lepidopsetta bilineata Ayres). J. Fish. Res. Bd. Can. 21(6): 1533-1534.

117. _____. 1964b. Demersal quality of fertilized eggs of rock sole (Lepidopsetta bilineata Ayres). J. Fish. Res. Bd. Can. 21(6): 1531-1532.

118. _____ and D.F. Alderdice. 1968. Preliminary observations on embryonic development of the flathead sole (Hippoglossoides elassodon). Fish. Res. Bd. Can. Tech. Rep. 100: 1-20.

119. Forster, R.P. and S.K. Hong. 1958. In vitro transport of dyes by isolated renal tubules of the flounder as disclosed by direct visualization. Intracellular accumulation and transcellular movement. J. Cell. Comp. Physiol. 51(2): 259-272.

120. Fugelli, K. 1967. Regulation of cell volume in flounder (Pleuronectes flesus) erythrocytes accompanying a decrease in plasma osmolarity. Comp. Biochem. Physiol. 22(1): 253-260.

Concluded that flounder erythrocytes are able to regulate their volume to counteract an osmotic swelling and that some of the solutes within the cell leave the cell during volume regulation.

121. Fujita, S. 1965. Early development and rearing of two common flatfishes, Eopsetta grigorjewi (Herzenstein) and Tanskius kitaharai (Jordan et Starks). Bull. Jap. Soc. Sci. Fish. 31: 258-262.

122. Fullarton, S.H. 1891. On the development of the plaice (Pleuronectes platessa). Rep. Fish. Bd. Scot. 1890. 3: 311-316.

123. Fulton, W. 1898. On the growth and maturation of the ovarian eggs of teleostean fishes. 16th Ann. Report of the Fish. Bd. for Scotland. 3: 88-125.

Notes on pelagic eggs of flatfish: halibut - Hippoglossus vulgaris; long rough dab - H. platessoides; turbot - Rhombus maximus; brill - R. sp.: sail fluke - Arnoglossus megastoma; plaice - Pleuronectes platessa; lemon dab - Pleuronectes microcephalus.

124. _____. 1908. On sea-fish hatching. The Loch Fyne experiments with plaice. Rep. Fish. B. Scot. 1907. 3: 40-72.

125. Futch, C.R. 1970. Contributions to the ecology of larval and juvenile lined sole, Achirus lineatus, in Tampa Bay, Fla. Fla. Dept. Nat'l. Res. Leaflet series 4(1). No. 17: 5pp.

126. _____. 1971. Larvae of Monolene sessilicauda Goode, 1880 (Bothidae). Fla. Dept. Nat'l. Res. Leaflet Series. 4(1) No. 21: 14pp.

127. _____ and R.H. Hoff, Jr. 1971. Larval development of Syacium papillosium (Bothidae) with notes on adult morphology. Fla. Dept. Nat'l. Res. Leaflet Series 4(1) No. 20: 22pp.

128. Garstang, W. 1900. Preliminary experiments on the rearing of sea-fish larvae. J. Mar. Biol. Ass. U.K. 6: 70-93.

129. Gill, T.N. 1864. Synopsis of the Pleuronectoids of California and north-western America. Phil. Acad. Nat. Sci., Proc. 197pp.

130. Gotshall, D.W. 1969. Stomach contents of Pacific hake and arrow-tooth flounder from northern California. Calif. Fish. Game 55(1): 75-82.

Atheresthes stomias - arrow-tooth flounder
Pandalus jordani, the ocean shrimp, was the dominate food of the hake and flounder.

131. Gray, I.E. 1960. Unusual pigmentation in the flounder, Paralichthys lethostigma. Copeia 1960(4): 346-347.

132. Gross, F. 1947a. An experiment in marine fish cultivation. I. Introduction Proc. Roy. Soc. Edinb. 63(b) : 1-2.

133. _____. 1947b. An experiment in marine fish cultivation. V. Fish growth in a fertilised sea-loch(Loch Craiglin) Proc. Roy. Soc. Edinb. 63(b): 53-95.

134. _____. 1950a. A fish cultivation experiment in an arm of a sea-loch. I. Introduction. Proc. Roy. Soc. Edinb. 64(B): 1-4.

135. _____. 1950b. A fish cultivation experiment in an arm of a sea-loch. V. Fish growth in Kyle Scotnish. Proc. Roy. Soc. Edinb. 64(B): 109-135.

136. Gudger, E.W. 1935. Abnormalities in flatfishes (Heterosomata). J. Morphology. 58(1): 1-39.

Review of literature on abnormalities in flatfish. Species include: Apsetta thompsoni, Hippoglossus hippoglossus, H. vulgaris, Limanda limanda, Rheinhardtius hippoglossoides, Rhombus maximus, Pleuronectes flesus, P. platessa, Pseudopleuronectes americanus, Rhombosolea tapirina, Solea vulgaris.

137. _____. 1941. A totally ambicolorate flounder, Platichthys stellatus, from Alaskan waters. Copeia. No. 1: 28-30.

138. Gutherz, E.J. 1966. Revision of the flounder genus Ancylopsetta (Heterosomata: Bothidae) with descriptions of two new species from the Antilles and the Caribbean Sea. Bull. Mar. Sci. 16(3): 445-479.

Key to Ancylopsetta species.

139. _____. 1967. Field guide to the flatfishes of the family Bothidae: in the Western North Atlantic. U.S. Fish. Wildl. Serv. Circ. No. 263. 47pp.

140. _____. 1970. Characteristics of some larval bothid flatfish, and development and distribution of larval spotfin flounder, Cyclopsetta fimbriata(Bothidae). Fish. Bull. 68(2): 261-283.

Baralichthys sp.
Ancylopsetta sp.
Symphuius sp.
Trinectes maculatus

140. Continued

Syacium sp.
Cyclopsetta sp.
Citharichthys sp.
Etropus sp.

141. _____ and R.R. Blackman. 1970 . Two new species of the flatfish genus Citharichthys (Bothidae) from the western North Atlantic. Copeia 1970(2): 340-348.

Citharichthys amblybregmatus
C. gymnorhinus

142. _____. 1971. Characteristics of some larval bothid flatfish and development and distribution of larval spotfin flounder, Cyclopsetta fimbriata (Bothidae). U.S. Fish. Wildl. Serv. Fish. Bull. 68(2): 261-283.

A badly needed handbook on the larval flatfish and associated literature from the south Atlantic coast of the United States.

143. Hamai, I. 1959. On the structure of the bottom fish community, especially the flatfish, Atheresthes evermanni, off the Pacific Coast of Hokkaido aroung Cape Erimo. Bull Mar. Biol. Sta. Asamushi Tohoku U. 9(4): 177-181.

144. Hanson, A. 1966. N-acetylhistidine as a donor of acetyl in the biosynthesis of acetylcholine in the fish (Labrus berggylta, Pleuronectes flesus) brain. Acta. Chem. Scan. 20(1): 159-164.

145. Harada, T. 1970. The present status of marine fish cultivation research in Japan. Helg. Wiss. Meer. 20: 594-601.

146. Hatanaka, M. et al. 1956. Growth and food consumption in plaice (Part I: Limanda yokohamae, Part II: Kareius bicoloratus) Tohoku J. of Agri. Res. 7(2).

147. Hayward, M.J., W.A. MacCallum and D.H. Shaw. 1970. Bacteriological evaluation of flounder (Hippoglossoides platessoides) frozen at sea and thawed by water immersion. Fish. Res. Bd. of Can. 27(11): 1983-1986.

Noted that flounder frozen at sea and thawed had low bacterial counts.

148. Herdman, W.A. 1897. The sea-fish hatching experiments. Rep. Lancs. Sea-Fish Labs. 1896. Pt. 2: 11-15.

149. Hickling, C.F. 1968. The farming of fish. Pergamon Press. London, England. 88pp.

150. Hickman, C.P., Jr. 1959. The osmoregulatory role of the thyroid gland in the starry flounder, Platichthys stellatus. Can. J. Zool. 37: 997-1060.

151. _____. 1962. Effect of salinity on the metabolic rate of gill and kidney of starry flounder, Platichthys stellatus. In: Summer Meeting of American Society of Zoologist, Oregon State University, Corvallis, Oregon, August, 1962. Amer. Zool. 2(3): 414.

152. _____. 1968a. Glomerular filtration and urine flow in the euryhaline southern flounder, Paralichthys lethostigma, in seawater. Can. J. Zool. 46(3): 427-437.

Glomerular filtration rate changed seasonally even in animals held at constant salinity. This pattern may be associated with the migratory behavior of the species. Simultaneous measurements of flow rates and major electrolyte composition of urine and rectal fluid were made and discussed.

153. _____. 1968b. Ingestion, intestinal absorption and elimination of seawater and salts in the southern flounder, Paralichthys lethostigma. Can J. Zool. 46(3): 457-466.

Renal and extrarenal uptake and elimination of Mg, Cl, SO_4, Na and K is described.

154. _____. 1968c. Urine composition and kidney tubular function in southern flounder, Paralichthys lethostigma, in seawater. Can. J. Zoo. 46(3): 439-455.

155. Hildebrand, S.F. and L.E. Cable. 1930. Development and life history of fourteen teleostean fishes at Beaufort, N.C. Bull. U.S. Bureau of Fish. 46: 383-488. (P. dentatus information p. 464-476.)

156. _____ and L.E. Cable. 1938. Further notes on the development and life history of some teleosts at Beaufort, N.C. Bull. U.S. Bur. Fish. 48: 505-642.

157. Hirado, S., J. Yamada and R. Kikuchi. 1955. Vitamin A in fish meat. Vitamin A content in skin of fishes. Jap. Soc. Sci. Fish. 21(6): 454-457.

Vitamin A content in skin on eyed side of flounder is greater than on blind side. Fish unknown from Abstract.

158. Hirano, T., D.W. Johnson and H.A. Bern. 1971. Control of water movements in flounder urinary bladder by prolactin. Nature. 230(5294): 469-471.

First paper to show proof that the flatfish bladder may play an important role in osmoregulation by modifying urine concentration.

159. Ho, J. 1962. On a new species of Lepeophtheirus (Copepoda parasitica) from Pseudopleuronectes americanus Walbaum. Pacific Sci. 16(4): 359-362.

Lepeophtheirus hidekoi is described and compared with 4 other species of this genus.

160. Hoff, J.C. and J.R. Westman. 1966. The temperature tolerance of three species of marine fishes. J. Mar. Res. 24(2): 131-140.

Temperature tolerance for Pseudopleuronectes americanus and two non-Bothoids were determined. Median tolerance limit for various exposure times and acclimation temperatures were also found.

161. _____, J.R. Westman and J. Masick. 1967. Flavor studies on Raritan Bay fish. Bull. N.J. Acad. Sci. 12(2): 12-14.

Paralichthys dentatus feed 1 ppm kerosene in the diet picks up the flavor of the oil.

162. Holiday, F.G.T. and M.P. Jones. 1967. Some effects of salinity on the developing eggs and larvae of the plaice (Pleuronectes platessa). J. Mar. Biol. Ass. U.K. 47: 39-48.

Eggs of P. platessa showed high mortality in salinities below 17.5 o/oo. After hatching, the yolk-sac larvae tolerated salinities of 15-60 o/oo for 1 week. After metamorphosis, tolerance to high salinity was less (45 o/oo) but tolerance to low salinity was greater (2.5 o/oo). Epidermis and kidney changes were thought to underlie the tolerance changes.

163. Hong, S.K. and R.P. Forster. 1958. Run-out of chlorphenol red following luminal accumulation by isolated renal tubules of the flounder in vitro. J. Cell. Comp. Physiol. 51(2): 241-247.

164. _____ and R.P. Forster. 1959. Further observations on the separate steps involved in the active transport of chlorphenol red by isolated renal tubules of the flounder in vitro. J. Cell. Comp. Physiol. 54(3): 237-242.

165. Hose, H.D., B.J. Copeland, F.N. Mosely and L. David. 1968. Fauna of the Aransas pass inlet, Texas etc. Tex. J. Sci. 20(1): 33-60.

Showed Ancylopsetta probably spawning in Nov. - Dec. and growth to 150 mm by August.

166. Hoss, D.E. 1964. Accumulation of zinc-65 by flounder of the genus Paralichthys. Trans. Am. Fish. Soc. 93(4): 364-368.

Paralichthys sp. concentrate Zn-65 to higher levels from food than from water. Accumulation rate from water was dependent on the concentration of the radionuclide in the water. Accumulation through food chain is more important than accumulation from the water.

167. _____. 1967. Marking postlarval paralichthid flounders with radioactive elements. Trans. Am. Fish. Soc. 96(2): 151-156.

Paralichthys dentatus
P. lethostigma
P. albigutta

168. Houde, E.D., C.R. Futch and R. Detwyler. 1970. Development of the lined sole, Achirus lineatus, described from laboratory-reared and Tampa Bay specimens. Fla. Dept. of Nat'l. Res. Research Series No. 62. 43pp.

169. Howell, B.R. 1972. Preliminary experiments on the rearing of larval Lemon sole Microstomus kitt (Walbaum) on cultured foods. Aquaculture 1(1): 38-44.

A technique is described to rear lemon sole through metamorphosis using cultured foods smaller than Artemia nauplii which have previously proven too large. Mussel trochopheres and the flagellate Brachionus plicatilis were found to be of some value as food.

170. Hsio, S. C. T. 1940. A new record of two flounders, Etropus crossotus (Goode and Bean) and Ancylopsetta dilecta (Goode and Bean), with notes on postlarval characters. Copeia 1940. 194-198.

171. Huntsman, A. G. 1918. Histories of New Food Fishes. I. The Canadian plaice. Bull. Biol. Bd. Can. 1: 32pp.

Life history of the halibut, Hippoglossoides platessoides Fabricicus, in Canadian waters including size, distribution, spawning and abundance is described. Plates on larval development are included.

172. Igarashi, H., K. Zama, K. Takama and M. Hatano. 1963a. Lipids of flounder. III. Liver lipids of the flounder, Hippoglossoides dubius. Bull. Fac. Hokkaido Univ. 14(2): 87-90.

List acetone-soluble liver lipids and properties.

173. _____, K. Zama, K. Takama and M. Hatano. 1963b. Lipids of flounder. IV. Eggs lipids of the flounder, Hippoglossoides dubrius. Bull. Fac. Fish. Hokkaido Univ. 14(2): 91-94.

Acetone-soluble lipids from flounder eggs.

174. Imaoka, T. and H. Misu. 1969. Fisheries biology of roundnose flounder, Eopsetta grigorjewi Herzenstein, in the South-western Japan Sea and its adjacent waters: I. Age and Growth. Bull. Seikai Reg. Fish. Res. Lab. 37: 51-70.

Age determined by otolith readings and growth are discussed on over 3800 specimens.

175. Jakubawski, M. 1960. The structures and vascularization of the skin of the leathen carp (Cyprinus carpio L. var. nuda) and flounder (Pleuronectes flesus luscus Pall.) Acta. Biol. Cracoviensia Ser. Zool. 3(2): 139-162.

Pleuronectes flesus

Vascularization of both sides of P. flesus are equal.

176. Jefferies, D. F. and C. J. Hewett. 1971. The accumulation and excretion of radioactive Caesium by the plaice (Pleuronectes platessa) and the thornback ray (Raia clavata). J. Mar. Biol. Ass. U.K. 51(2): 411-422.

176. Continued

Plaice obtains at least 50% of its Caesium from food, the ray receives more than 80%. Co is absorbed via the gut in both species. Excretion in both species appears to be 90% extrarenal.

177. Jensen, A.J.C. 1960a. Danish investigations on young flatfish in coastal waters, and on plaice in open waters in the year 1960. Ann. Biol. 17: 104-106.

Pleuronectes platessa

178. _____. 1960b. Investigations on young flatfish in coastal waters and on plaice in open waters, (Baltic-belt seas) 1960. Ann. Biol. 17: 112-113.

179. Johansen, A.C. 1927. On the fluctuations in the quantity of young fry among plaice and certain other species of fishes and causes of same. Rep. Danish. Biol. Sta. 33: 5-16.

180. _____. 1928a. Experiments in transplanting young plaice from the North Sea and the Limfjord to the Belt Sea and adjacent waters in the spring of 1928. J. Cons. Int. Explor. Mer. 3: 367-370.

181. _____. 1928b. The extent of the annual transplantations of plaice in the Limfjord and the yield resulting therefrom. Rep. Danish. Biol. Sta. 34: 53-86.

182. Kariya, T. and S. Shirakata. 1955. On the growth of the ovum of the flatfish, Limanda yokohamae (Gunther). Bull. Jap. Soc. Sci. Fish. 21(7): 476-482.

Limanda yokohamae

Spawning season in winter.

183. _____. and S. Shirakata. 1968. An experiment to estimate the satiation rate of feeding in fish. Bull. Jap. Soc. Sci. Fish. 34(1): 29-35.

184. Kelly, W.H. 1967. Marking freshwater and marine fish by injected dyes. Trans. Am. Fish. Soc. 96(2): 168-175.

Over 150 dyes were tested as fish marking agents. The two best dyes persisted for over two years.

185. Ketchen, K.S. and C.R. Forrester. 1966. Population dynamics of the petrale sole, Eopsetta jordani, in waters off western Canada. Fish. Res. Bd. Can. Bull. 153: 1-195.

186. Khrapkova, N.V. 1961. Spawning assemblages of food fishes in the Kronotsk Gulf. Trudy. Inst. Okeanol. Akad. SSSR. 36: 123-142.

187. Kinnear, J.E. 1960. The minimum dosage of thiourea effectively inhibiting thyroxine synthesis in the flounder (Platichthys stellatus). Can. J. Zool. 38(5): 917-922.

Concentrations of thiourea from .0025% to .03% prevented thyroxine production.

188. Kirk, R.G. 1972. Anomalous growth of young plaice (Pleuronectes platessa L.) on diets of live, frozen and freeze-dried Lumbricillus rivalis Levinson. Aquaculture 1(1): 35-37.

Live Lumbricillus rivalis proved to be a markedly superior food to both freeze-dried and frozen forms. It is suggested that the difference in the food value of the three forms may be the degradation of steroids in the non-living forms.

189. _____ and B.R. Howell. 1972. Growth rates and food conversion in young plaice (Pleuronectes platessa L.) fed on artificial and natural diets. Aquaculture 1(1): 29-34.

The enchytraeid worm Lumbricillus rivalis fed live produced significantly higher growth and lower food conversion ratios than artificial diets containing fish or soya-bean meals.

190. Kobayashi, M., C.L. Prosser and T. Nagai. 1967. Electrical properties of intestinal muscle as measured intracellularly and extracellularly. Am. J. Physiol. 213(1): 275-286.

191. Koike, A. 1968. Catching effeciency of Masu-ami with different colored bag nets. I. The effect of colored bag-nets on catch. Bull. Jap. Soc. Sci. Fish. 34(3): 177-184. Japanese with English abstract.

Showed some flatfish may have a color preference in that they are caught more readily by the colored bags.

192. Korringa, P. 1968. Biological consequences of marine pollution with special reference to the North Sea fisheries. Helg. Wiss. Meer. 17(¼): 126-140.

193. Kosaka, M. 1956. Experimental studies on the habital preference and evaluation of environment by flatfishes, Limanda yokohamae (Gunther) and Kareius bicoloratus (Basilewsky). Bull. Jap. Soc. Sci. Fish. 22(5): 284-288.

Flatfish preferred sand bottom.

194. Krivobak, M.N. and O.I. Tarkovskaya. 1964. Chemical composition of yellowfin sole, cod and walleye pollock of the southeastern Bering Sea. Ref. Zk. Biol. 1964 No. 21151 (Translation).

Limanda aspera

Fat, glycogen and N. were measured for these species.

195. Kubota, M., K. Hagiya and S. Kimura. 1971. Amino acid composition and solubilization of fish egg shell membrane. J. Tokyo Univ. Fish. Fish. 57(2 part 1): 87-94.

196. Kuntz, A. 1916. Notes on the embryology and larval development of five species of teleostean fishes. Bull. U.S. Bur. Fish. Vol. 34 (1914): 407-429.

197. Kurata, H. 1956. On the rearing of larvae of the flatfish, Liopsetta obscura, in small aquaria. Bull. Hokkaido Reg. Fish., Res. Lab. 13: 20-29.

198. Kyle, H.M. 1898. The postlarval stages of the plaice, dab, flounder, long rough dab and lemon dab. 16th Ann. Report of the Fish. Bd. for Scotland. 3(4): 225-247.

199. _____. 1899. The classification of the flatfishes (Heterosomata) Rep. Fish. Bd. Scot. 18: 338pp.

200. _____. 1913. Flatfishes (Heterosomata). Rep. Dan. Oceanogr. Exped. Med. 2: 1-150.

201. _____. 1921. The asymmetry, metamorphosis and origin of flatfishes. Roy. Soc. London, Phil. Trans., Ser. B. 211: 75-129.

202. Lahlou, B. 1967. Renal excretion in a euryhaline fish, the flounder (Platichthys flesus L.): Characteristics of normal urine in fresh and salt water and effects from environment changes. Comp. Biochem. Physiol. 20(3): 925-938.

Changes in the urine composition to adjust to changes in salinity is complete after 48 hours. The glomerular filtration rate, urine flow, osmotic pressure and concentration of Na, K, Cl and Ca all are measured. Modes of adaption to wide salinities are suggested.

203. Lange, R. and K. Fugell. 1965. The osmotic adjustment in the euryhaline teleosts, the flounder, Pleuronectes flesus L. and three-spined stickleback, Gasterosteus acerleatus L. Comp. Biochem. Physiol. 15(3): 283-292.

204. Lebour, M.V. 1918. The food of postlarval fish. I. J. Mar. Biol. Ass. U.K. Vol. 2(4): 433-469.

205. Lee, J.S., M.A. Shiflett and R.O. Sinnhuber. 1965. Radiation pasteurization of seafood - I. The combined effect of sodium-benzoate and irradiation for retarding microbial growth in Dover sole (Microstomus pacificus). Int. J. Appl. Radiat. Isotop. 16(4): 221-226.

Microbial spoilage retarded with .1% sodium benzoate in addition to pasteurizing doses of gamma radiation. Results of other levels of these two microbial inhibitors are given.

206. Leonard, S.B. 1971. Larvae of the fourspot flounder, Hippoglossina oblonga (Pisces: Bothidae) from the Chesapeake Bight, western North Atlantic. Copeia. 1971(4): 676-681.

Larvae collected in Chesapeake Bight, identified, illustrated and described.

207. Liston, J. 1956. Quantitative variations in bacterial flora of flatfish. J. Gen. Microbiol. 15(2): 305-314.

Lemon sole and skate - bacterial count over 27 months showed seasonal variation in bacterial numbers.

208. Llewellyn, L.C. 1965. Some aspects of the biology of the marine leech, Hemibdella soleae. Proc. Zool. Soc. London. 145(4): 509-528.

208. Continued

H. Soleae attach by posterior sucker to spines on the ctenoid scales of the upper surface of Solea solea, multiple infections were common.

209. Love, T.D. 1961. Report of "jellied" flounder from the Gulf of Mexico. Comm. Fish. Rev. 23(8): 9-10.

Paralichthys squamalintus

Paralichthys squamalintus meat was examined and found to have no abnormalities other than the disappearance of separate muscle fibers.

210. Lucas, C.E. and K.A. Pyefinch. 1968. Fisheries of Scotland. Scot. Dep. Agr. Fish. Rep. 1967: 178pp.

Pleuronectes platessa

P. platessa thyroid hormone development, metabolic rate, energy conversion and mineral content are discussed.

211. Lundin, S.J. 1964. Purification of a cholinesterase from plaice (Pleuronectes platessa). Acta. Chem. Scand. 18(9): 2189-2190.

212. _____. 1968. Properties of cholinesterase from body muscles of plaice (Pleuronectes platessa). Acta. Chem. Scand. 22(7): 2183-2190.

213. Lux, F.E. 1959. A case of partial albinism in the four-spotted flounder, Hippoglossina oblonga. Copeia 1959(3): 253.

Specimen 158 mm pigmented only on anterior head region on eyed side and on fins.

214. _____. 1960. Length shrinkage of yellowtail flounder between live and landed condition. Trans. Am. Fish. Soc. 89(4): 373-374.

Limanda ferruginea

Limanda ferruginea shrank some 1.2-1.5% within two weeks when stored on ice.

215. _____. 1963. Identification of New England yellowtail flounder (Limanda ferruginea) groups. U.S. Fish. Wildl. Serv. Fish. Bull. 63(1): 1-10.

215. Continued

Identifies three groups of New England yellowtail flounder on basis of morphological differences.

216. _____, P.E. Hamer and J.C. Poole. 1966. Summer flounder . . . the Middle Atlantic flatfish. Marine Res. of the Atlantic Coast Leaflet No. 6. Atlantic States Mar. Fish. Comm. Tallahassee, Fla. 4pp.

Paralichthys dentatus

Describes very generally the life cycle and fisheries data.

217. _____ and L.R. Porter, Jr. 1966. Length-weight relation of the summer flounder, Paralichthys dentatus (Linnaeus). Special Sci. Report - Fisheries 531: 5pp.

218. _____. 1969. Length-weight relationships of six New England flatfishes. Trans. Am. Fish. Soc. 98(4): 617-621.

Length-weight relationships are reported for:
Limanda ferruginea
Pseudopleuronectes americanus
Hippoglossoides platessoides
Glyptocephalus cynoglossus
Paralichthys oblongus
Scophtalmus aquosa

219. Maack, T. and W.B. Kinter. 1969. Transport of protein by flounder kidney tubules during long-term incubation. Am. J. Physiol. 216(5): 1034-1043.

Demonstrated the first quantitative evidence for intact protein transtubular transport in the kidney.

220. Makarewicz, W. 1968. Temperature-dependence of fish muscle amp - aminohydrolase. J. Mar. Biol. Ass. U.K. 485: 535-542.

Scophthalmus maximus

Showed that despite an increase in temperature (30-50^{o} C) the reaction rate of amp-aminohydrolase on muscle extract decreased.

221. Malard, A.E. 1899. Sur. le developpment et la pisciculture du turbot. C.R. Acad. Sci., Paris. 129: 181-183.

222. Manikiam, J.S. 1970. A guide to the flatfishes (order Heterosomata) of New Zealand (systematic list). Tuatara 17(3): 118-129.

223. Markowski, S. 1966. The diet and infection of fishes in Cavendish Lock Barrow-in-Furness. J. Zool. Proc. Zool. Soc. London. 150(2): 183-197.

224. Marr, J.C. 1956. The "critical period" in the early life history of marine fishes. J. Cons. Int. Explor. Mer. 21: 160-170.

Reviewed 3 postulations as to critical stage in life of fish (marine): 1) yolk absorption (suggested by Hjort, 1926) who said lack of food immediately after yolk absorption may cause mass mortality; 2)egg stage (suggested by Rollefsen, 1930); and 3) larval stages (Hjort, 1926 and Sund, 1924) who suggest larvae may be carried by currents from food source.

225. Martin, W.R. and F.D. McCracken. 1950. Movements of halibut on the Canadian Atlantic coast. Progress Rep. Atlantic coast stations. Fish. Rep. Bd. Canada. 50: 3-6.

226. Maski, H., K. Munk, J.D. H. Homan, J. Bouman, and R. Matthijsen. 1957. On the distribution of insulin and zinc in different cell constituents of the islands on Langerhans in flounders and plaice (Pleuronectidae). Zeitschi Naturforsch. 11b(7): 407-415.

227. Mast, S. O. 1916. Changes in shade, color and pattern in fishes and their bearing on the problems of adaption and behavior, with especial reference to the flounders, Paralichthys and Ancylopsetta. Bull. U.S. Bur. Fish. Vol. XXXIV 1914(1916): 173-283.

Classic in flatfish background color and pattern changes.

228. May, R.C. 1971. An annotated bibliography of attempts to rear the larvae of marine fishes in the laboratory. N. M. F. S. Spec. Sci. Rep. - Fish. Series. No. 632: 30pp.

229. McArn, G.E., R.G. Chuinard, B.S. Miller, R.E. Brooks and S.R. Wellings. 1968. Pathology of skin tumors found on English sole and starry flounder from Puget Sound, Washington. J. Nat. Cancer Inst. 41(1): 229-242.

229. Continued

Parophrus vetulus
Platichthys stellatus
Isopsetta isolepis
Psettichthys melanostictus

All four species showed a significant incidence of skin tumors, the microscopic morphology of which is discussed.

230. _____ and S.R. Wellings. 1972. A comparison of skin tumors in three species of flounder. J. Fish. Res. Bd. Can. 28(9): 1241-1251.

Parophrys vetulus
Platichthys stellatus
Hippoglossoides elassodon

Skin tumors occuring on these species were described.

231. McCracken, F.D. 1963. Seasonal movements of the winter flounder, Pseudopleuronectes americanus Walbaum, on the Atlantic Coast. J. Fish. Res. Bd. Can. 20(2): 551-586.

Pseudopleuronectes americanus moves offshore in summer months when water temperatures rise above 15° C. to waters where the temperature is about 12° C. Immature fish are shallowest in summer distribution, juveniles deeper and mature fish are found in both regions.

232. McHugh, J.L. and B.W. Walker. 1948. Rearing marine fishes in the laboratory. J. Calif. Fish. and Game. 34: 37-38.

233. McIntosh, W.C. 1894. Contribution to the life histories and development of the food and other fishes. The 12th Annual Report of the Fish. Bd. for Scotland. III(B): 218-233.

234. _____ and A.T. Masterman. 1897. The life histories of the British marine food-fishes. Cambridge University Press. 516pp.

235. _____ and E.E. Prince. 1890. On the development and life histories of the teleostean food- and other fishes. Trans. Roy. Soc. Edinb. 35: 655-944.

236. Medcof, J.C. 1946. More reversed winter flounders. In Letters to the Editor. Science 103(2677): 488.

Pseudopleuronectes americanus

237. Millar, R.H. and J.M. Scott. 1965. The use of a direct counting technique for bacteria in marine culture experiments. J. du Conseil. Vol. XXIX(3): 253-255.

238. Miller, B.S. 1967. Stomach contents of adult starry flounder (Platichthys stellatus) and sand sole (Psettichthys melanostictus) in East Sound, Orcas Island, Washington. J. Fish Res. Bd. Can. 24(12): 2515-2526.

Both species appeared to be daytime feeders. P. stellatus ceased feeding in months of lowest temperatures while the sand sole showed little feed reduction during this item. Food items and description of gross digestive processes are discussed.

239. Miller, David and R.R. Marak. 1962. Early larval stages of the fourspot flounder, Paralichthys oblongus. Copeia. 1962(2): 454-455.

240. Milroy, T.H. 1898. The physical and chemical changes taking place in the ova of certain marine teleosteans during maturation. 16th Ann. Rep. of the Fish. Bd. for Scot. III(IV): 135.

Worked on eggs of plaice, turbot, haddock, brill, flounder. Looked at specific gravity, weight, composition, etc.

241. Mironov, O.G. 1967. Effect of low concentrations of petroleum and its products on the developing roe of the Black Sea flatfish. Vop Ikhtiol 7(3): 577-580.

Platichthys flesus

Petroleum and petroleum products are toxic to flatfish eggs at concentrations of 10^{-3}, 10^{-4} and 10^{-5} ml/l. The mode of toxicity appears to be embryonic metabolism interference.

242. Mito, S., M. Ukawa and M. Higuchi. 1969. On the egg development and rearing of the larvae of a flounder, Kareius bicoloratus (Basilewsky) with reference to its spawning in the culturing pond. Bull. Nansei Reg. Fish. Res. Lab. 1: 87-102. (Japanese with English summary).

243. Moden, J.C. 1969. Residues in fish, wildlife and estuaries - chlorinated hydrocarbon pesticides California Bays and Estuaries. Pest. Monitor. J. 3(1): 1-7.

Ova of flounder, halibut and sole contained DDE, DDD and DDT.

244. Molander, A.R. 1925. Observations on the witch (Pleuronectes cynoglossus L.) and its growth. Publ. Circ. Conc. Explor. Mer. 85: 1-15.

245. _____ and Molander-Swedmar, M. 1957. Experimental investigations on variation in plaice (Pleuronectes platessa Linne). Inst. Mar. Res. Lysekil. Ser. Biol. Rep. 7: 45pp.

246. Moore, E. 1947. Studies on the marine resources of southern New England. VI. The sand flounder, Lophosetta aquosa (Mitchill): A general study of the species with special emphasis on age determination by means of scales and otoliths. Bull. Bingham Oceanogr. Collect. 11(3): 79pp.

247. Morris, R.W. 1956. Some aspects of the problem of rearing marine fishes. Bull. Inst. Oceanogr. Monaco. 53. No. 1082: 1-61.

A good review of literature concerning such topics as the "critical period", the physical rearing apparatus, environmental parameters, aeration and collection of specimens, is included. Several easily made pieces of equipment to increase survival are illustrated.

248. Morrow, J.E. 1944. A size record for the winter flounder, Pseudopleuronectes americanus. Copeia. 1944(3): 186.

A specimen weighing over 2,600 gms and some 56 cm is recorded.

249. Murawski, W.S. 1963. Fluke investigations. N.J. Fed. Aid. Pro. F-15-R-4 (Completion Report for Job 3). N.J. Dept. Cons. and Econ. Develop.

250. _____. 1964. Fluke investigations. N.J. Fed. Aid Project. F-15-R-4 (Completion Report for Job 3). N.J. Dept. Cons. and Econ. Develop.

251. _____. 1970. Results of tagging experiments of summer flounder, Paralichthys dentatus, conducted in New Jersey waters from 1960-1967. Mis. Rep. No. 5M of the N.J. Dept. Environ. Prot. 54pp.

Tagging indicated an offshore movement of adults during spawning season.

252. Murphy, W.K. 1969. U.V. sterilization of water and its relation to maintaining aquatic organisms. Contrib. Underwater Technology Conference. San Diego, Calif. March, 1969: 9-12. Am Soc. of Mech. Engin.

253. Musienko, L.N. 1960. Young flatfishes (Pleuronectidae) of the far eastern seas. 2. Distribution, age and growth. Trudy Inst. Okeanol. Akad. Nauk, SSSR (Transl). 20: 254-283.

254. Nash, C.E. 1968. Power stations as sea farm. New Scientist, Nov. 14, 1968: 366-369.

Pleuronectes platessa
Solea solea

Describes attempts to raise plaice and sole in thermal effluents of power stations with 15-16° best for plaice and 18-20° best for sole. Fed chopped oyster (Mytilus edulis) 10% of biomass daily.

255. Neiman, A.A. 1960. The food base of flatfish in the eastern part of the Bering Sea. Rybnoe Khoy. 10: 6-11.

256. Nichols, J.T. and C.M. Breder. 1927. The marine fishes of New York and southern New England. Zoologica 9(1): 1-192.

Pseudopleuronectes americanus

Data on the winter flounder is included on pages 178-180.

257. Nicol, J.A.C. 1965. Retinomotor changes in flatfish. J. Fish. Res. Bd. Can. 22(2): 513-520.

Solea solea
Pleuronectes platessa
Microstomis kitt

All show normal teleost photomechanical responses to illumination.

258. Nigrelli, R.F., K.S. Ketchen and G.P. Ruggieri. 1965. Studies on virus diseases of fishes. Epizoobiology of epithelial tumors in the skin of flatfishes of the Pacific coast, with special reference to the sand sole (Psettichthys melanosticus) from northern Hecate Strait, British Columbia, Canada. Zoologica (New York). 50(3): 1115-1122.

259. Nikolaev, A.P. 1959. Observations on the development of the eggs and larvae of the stellate flounder, Pleuronectes stellatus Pallas. Izvest. Tikhookeanskogo Nauch. Issledovatel. Inst. Rybnogo Khoz. i. Okeanol. 47: 190-192.

Development of the stellate flounder takes about 7 days at 9° C.

260. Nordenberg, C. 1962. The occurance of lymphocystitis in plaice and flounder in Oresund. Kungl. Fysiogr. Sallskapets i Lund Forhandl. 32(3): 17-26.

Pleuronectes platessa
Pleuronectes flesus

261. Nordgaard, O. 1914. Beretning om forsøk med utklaekking av guldflyndre (Pleuronectes platessa, Linn.). K. norske vidensk. Selsk. Skr. 1913. Nr. 6. Meddelelse fra Trondhjems biologiske stasjon, Nr. 6. 104pp.

262. Norman, J.R. 1934. A systematic monograph of the flatfishes (Heterosomata). Vol. 1, British Museum N.H.: 459 pp.

263. Ochiai, A. and K. Amooka. 1963. Description of larvae and young of four species of flatfishes referable to subfamily Bothinae. Bull. Jap. Soc. Sci. Fish. 29: 127-134.

264. Ogden, C.G. 1965. A new species of Capillaria (Nematoda), Capillaria wickinsi sp. nov., from the marine fish, Pleuronectes platessa. Ann. Mag. Natur. Hist. 8(91/92): 451-453.

265. Okiyama, M. 1967. Study on the early life history of a flounder, Paralichthys olivaceus (Temminck et Schlegel). I. Description of postlarvae. Bull. Jap. Sea Reg. Fish. Res. Lab. 17: 1-12.

266. _____ and W. Tomi. 1970. A reversed ambi-colorate flathead flounder, Hippoglossoides dubius (Schmidt) from the Japan sea. Jap. J. Ichthyol. 17(2): 84-85.

267. Orcutt, H.G. 1950. The life history of the starry flounder, Platichthys stellatus (Pallas). Calif. Dept. Fish. Game. Fish. Bull. 78: 64pp.

268. Oriordan, C.E. 1964. Some variations of flounder, brill and turbot in the collections of the National Museum of Ireland, Dublin. Irish Natur. J. 14(9): 208-209.

269. Osborn, C.M. 1939. The physiology of color change in flatfishes. J. Exp. Zool. 81(3): 479-515.

270. _____. 1940. The experimental production of melanin pigment on the lower surface of summer flounder, Paralichthys dentatus. Woodshole Oceanographic Inst. Collectes reprints. Contribution no. 247.

271. Oven, L.S. 1967. Reproduction of the Black Sea flounder, Platichthys flesus Luscus. Vop Ikhtiol 7 (1): 94-100.

P. flesus lays only a part of her eggs at any one time during the year as they become developed. Due to this fact a female may lay eggs weighing as much or more than herself within a given season.

272. Pearcy, W.G. 1961. A tail-less flounder. Trans. Am. Fish. Soc. 91(1): 233-234.

Pseudopleuronectes americanus

273. _____. 1962a. Distribution and origin of demersal eggs within the order Pleuronectiformes. J. Cons. Perm. Inter. Explor. Mer. 27(3): 232-235.

Five species of flatfish with demersal eggs show similar adult morphology and larval characteristics. It is suggested these arose from a common ancestral stock which may have been showing an adaptive development in its life cycle.

274. _____. 1962b. Ecology of an estuarine population of winter flounder, Pseudopleuronectes americanus (Walbaum). I. Hydrography of the Mystic River estuary. Bull. Bingham Oceanogr. Coll. 18(1): 5-15.

275. _____. 1962c. Ecology of an estuarine population of winter flounder, Pseudopleuronectes americanus (Walbaum). II. Distribution and dynamics of larvae. Bull. Bingham Oceanogr. Coll. 18(1): 16-38.

Larvae most common from March to June in brackish waters. Larvae were shown to have benthic as well as planktonic behavior.

276. _____. 1962d. Ecology of an estuarine population of winter flounder, Pseudopleuronectes americanus (Walbaum). III. Distribution, abundance, growth and production of juveniles, survival of larvae and juveniles. Bull. Bingham Oceanogr. Coll. 18(1): 39-64.

Total mortality during larval and juveniles stages was about 99.98-99.99%.

277. _____. 1962e. Ecology of an estuarine population of winter flounder, Pseudopleuronectes americanus (Walbaum). IV. Food habits of larvae and juveniles. Bull. Bingham Oceanogr. Coll. 18(1): 65-78.

277. Continued

Stomach content analysis of winter flounder through life cycle in the wild. Primary food for larvae and juveniles was harpacticoid copepods; older juveniles consumed mainly calanoid copepods through late summer. Polychaetes became more important as food with age of the fish. Winter flounder fed mainly by day.

278. Pedersen, R.A. 1971. DNA content, ribosomal gene multiplicity and cell size in fish. J. Exp. Zool. 177(1): 65-78.

Psuedopleuronectes americanus and 5 others

279. Pentreath, R.J. and D.F. Jefferies. 1971. The uptake of radionuclide by I-Group plaice (Pleuronectes platessa) off the Cumberland Coast, Irish Sea. J. Mar. Biol. Ass. U.K. 51(4): 963-976.

280. Perlmutter, A. 1946. The distribution of the winter flounder (Pseudopleuronectes americanus) and its bearing on management possibilities. Trans. 11th N. Amer. Wildl. Conf. 1946: 239-250.

281. _____. 1947. The blackback flounder and its fishery in New England and New York. Bull. Bingham Oceanog. Collection, Vol. 11, Art. 2: 92pp.

Pseudopleuronectes americanus

282. Pertseva-Ostroumova, T.A. 1960. The reproduction and development of the needle-toothed halibut, genus Atherestes (Jordan et Gilbert) (Pleuronectidae, Pisces). English Summary. Zool. Zhur 39(110: 1658-1669.

Breeding took place January-February in water temp. of 2-3° C. Eggs 3-4 mm and are bathypelagic. Young feed in coastal zones.

283. _____. 1963a. New data on the distribution of flounder spawn in Primor'e waters. Tr. Inst. Okeanol. Adak. Nauk. SSSR. 62: 13-27 (English summary). Referat. Zhur. Biol. 1963 No. 20133 (Translation).

Paralichthys olivaceus
Cleisthenes herzensteini
Limanda aspera
L. punctatissima
Pseudopleuronectes herzensteini

The fish listed above spawn in June-July at depths of 14-30 m and 10-16° C.

283. Continued

Glyplocephalus stelleri spawn June-July at 25-75 m at 4-14° C.

Acanthopsetta nadeskyi spawn June-August in greater than 50 m at 1.5-3.2° C.

284. _____. 1963b. Features of the reproduction and development of the flounder having benthic and pelagic roe. In: Problems of Ecology. Vysshaya Shkola: Moscow. 5: 161-163.

285. _____. 1965. Larval flatfishes (Heterosomata) of the Gulf of Tonkin. T.R. Inst. Okeanol. Akad. Nauk. SSSR 80: 177-220, or Ref. Zh. Biol. 1966, No. 2160 (Translation).

Describes 20 species of flatfish in the area of the Gulf of Ton kin, Viet Nam. Larvae of 19 species are described for the first time.

286. Peters, David S. and J.W. Angelovic. 1971. The effects of temperature, salinity and food availability on growth and energy utilization of juvenile summer flounder, Paralichthys dentatus. Submitted to the Third National Symposium on Radioecology.

0-group Paralichthys dentatus showed highest growth and feeding rates at highest temperatures - most efficient at 2/3 ad libitum level and at 20-25° C. Growth rate increases as salinity increased from 10% to 30%.

287. Petersen, C.G.J. 1894. On the biology of our flatfishes and on the decrease of our flatfish fisheries. Rep. Danish Biol. Sta. 1893: 1-146.

288. Phillips, J.B. 1963. A fantail sole, Xystreurys liolepis, in Monterey Bay. Calif. Fish and Game 49(3): 209.

Monterey Bay is established as a definite northern boundary.

289. Pinkey, K.F. 1930. Some observations on the effect of changes of temperature on respiratory rhythm in flounders. Manuscript Dept. Biol. Sta. Fish. Res. Bd. Can., 90: 1-16.

Pseudopleuronectes americanus

290. Pitt, T.K. 1970. Distribution, abundance and spawning of yellowtail flounder, Limanda ferruginea in the Newfoundland area of the northwest Atlantic. J. Fish. Res. Bd. Can. 27(12): 2261-2271.

Highest concentration of L. ferruginea is in the Grand and St. Pierre banks in 31-35 fathoms and 3.1-4.8° C. Peak spawning was in the latter half of June.

291. Poole, J.C. 1961. Age and growth of the fluke in Great South Bay and their significance to the sport fishery. N.Y Fish and Game J. 8(1): 1-18.

Paralichthys dentatus

Females at age I, II and III were 27.1, 37.7 and 46.5 cm respectively. Males were correspondingly 25.1, 32.6, and 38.7 cm. Data in question at present time.

292. _____. 1962. The fluke population of Great South Bay in relation to the sport fishery. N.Y. Fish and Game J. 9(2): 93-117.

Paralichthys dentatus

Tagging indicated overexploitation of the fluke by commercial, sport and winter trawl fisheries. The Great South Bay (N.Y.) is the primary summer nursery ground and despite overexploitation, summer flounder continued to return to the bay.

293. _____. 1964. Feeding habits of the summer flounder in Great South Bay. N.Y. Fish and Game J. 11(1): 28-34.

Paralichthys dentatus

Stomachs of over 1,000 P. dentatus from New York area contained primarily sand shrimp and winter flounder.

294. _____. 1966a. The use of salt-water coves as winter flounder nursery grounds (Pseudopleuronectes americanus). N.Y. Fish Game J. 13(2): 221-225.

Sampling indicated that coves were the preferred over adjacent bays as a habitat for young-of-the-year flounder.

295. _____. 1966b. A review of research concerning summer flounder and needs for further study. N.Y. Fish and Game J. 13(2): 226-230.

Paralichthys dentatus

296. _____. 1966c. Growth and age of winter flounder in four bays of Long Island (Pseudopleuronectes americanus). N.Y. Fish and Game J. 13(2): 206-220.

Using otoliths, age was inferred and compared to length. Length at given ages differed significantly between certain of the bays with generally larger-sized fish being found in the more eastern bays.

297. Powles, P.M. 1965. Life history and ecology of American plaice (Hippoglossoides platessoides F.) in Magdalen shallows. J. Fish Res. Bd. Can. 22: 565-598.

298. _____ and V.S. Kennedy. 1967. Age determination of Nova Scotian grey sole, Glyptocephalus cynoglossus L., from otoliths. Int. Comm. Northwest. Atl. Fish Res. Bull. 4: 91-100.

299. _____. 1969. Size changes, mortality and equilibrium yields in an exploited stock of American plaice (Hippoglossoides plassoides) J. Fish. Res. Bd. Can. 26: 1205-1235.

300. _____ and A.C. Kohler. 1970. Depth distributions of various stages of witch flounder (Glyptocephalus cynoglossus) off Nova Scotia and in the Gulf of St. Lawrence. Fish. Res. Bd. of Can. 27(11): 2053-2062.

Depth distribution infers life cycle and distribution. Eggs demersal; larvae may persist to 1 year and exceed 40 mm in length and be found in 30-40 meters; upon metamorphosis juveniles move to extremely deep (140-450 meters), adults mature at 7-10 years (37-40 cm) and are found in mud in 40 meters.

301. Pradham, M.J. and M.H. Dhulkhed. 1962. On the natural distribution of the flatfish Laeops guentheri Alcock. J. Mar. Biol. Ass. India 4(2): 240-241.

302. Preston, A. 1960. Red blood values in the plaice (Pleuronectes platessa L.) J. Mar. Biol. Ass. U.K. 39: 681-687.

Preliminary research on blood of plaice to see if radiation would effect the blood composition.

303. Pruter, A. T. and D. L. Alderson. 1962. Abundance distribution and growth of flounders in the south-eatern Chukchi Sea. J. Consul. Perm. Internatl. Explor. Mer. 27(2): 81-99.

Pleuronectes quadritubercalatus
Atheresthes stomias
Hippoglossoides robustus
Limanda aspera

304. Puck, T. T., K. Wasserman and A. P. Fishman. 1952. Some effects of inorganic ions on the active transport of phenol red by isolated kidney tubules of the flounder. J. Cell. and Comp. Physiol. 40(1): 73-88.

305. Punpoka, S. 1966. A review of the flatfishes (Pleuronectiformes-Heterosomata) of the Gulf of Thailand and its tributaries in Thailand. Kasetsart Univ. Fish. Res. Bull. 1: 1-86.

A review of some fifty species of flatfish found or suspected to be present in the Gulf of Thailand and its tributaries.

306. Qusim, S. Z. 1955a. Time and duration of the spawning season in some marine teleosts in relation to their distribution. J. Cons. Perm. Int. Explor. Mer. 21: 144-155.

307. _____. 1955b. Rearing experiments on marine teleost larvae and evidence of their need for sleep. Nature (London) 175: 217-218.

308. Rae, B. B. 1965. The Lemon Sole. The Whitefriars Press Ltd. London 106pp.

Microstomus kitt

309. Rafail, S. Z. 1967. A statistical analysis of ration and growth relationship of plaice (Pleuronectes platessa). J. Fish. Res. Bd. Can. 25(4): 717-732.

310. Rasskazov, V. A. et al. 1968. Some properties and specificity of acid deoxyribonuclease from plaice liver. Comp. Biochem. Physiol. 26(2): 639-649.

Pseudopleuronectes herzensteini

The enzyme was activated by Mg^{++}, Ca^{++}, Na^{+}, and K^{+}. It preferentially cleaved dPyp-Pup linkages.

311. Raymont, J. E. G. 1947. An experiment in marine fish cultivation. IV. The bottom fauna and the food of flatfishes in a fertilized sea-loch. (Loch Craiglin). Proc. Roy. Soc. Edinb. 63(b). 34-35.

312. Rauch, G. 1969. A simple way for tagging flatfish by means of a tagging gun. Arch. Fischereiwiss. 29(2/3): 186-187.

313. Reber, E. F., M. H. Bert, E. M. Rust and E. Kuo. 1968. Biological evaluation of protein quality of radiation - pasteurized haddock, flounder and crab. J. Food Sci. 33(3): 335-337.

314. Reed, P. H. 1964. Recent occurrences of intergeneric hybrid flounder, Inopsetta ischyra (Jordan and Gilbert), from California and Oregon. Calif. Fish and Game. 50(2): 118-121.

Review existing literature on hybrid nature of Inopsetta and further describes two new specimens.

315. Reid, G. K., A. Inglis, H. D. Hoese. 1956. Summer foods of some fish species in East Bay, Texas. Southwestern Nat. 1(3): 100-104.

316. Reimann, Z. 1960. Investigations on flatfish fry off the coasts of the southern Baltic in the period 1954-1960. Ann. Biol. 17: 113-114.

317. Riley, J. D. and G. T. Tahcker. 1963. Marine fish culture in Britain. III. Plaice (Pleuronectes platessa L.) rearing in closed circulation at Lowestoft, 1961. J. Cons. Int. Explor. Mer. 28: 80-90.

Describes attempts to increase survival of egg through metamorphosis note: 3rd in a series - See Shelbourne et al., for first two.

318. _____. 1966. Marine fish culture in Britain VIII. Plaice (Pleuronectes platessa L.) postlarval feeding on Artemia salina nauplii and the effects of varying feeding levels. J. Con. Int. Ex. Mer. 28: 50-69.

Pigmentation and physical abnormalities were related to food quantity in plaice larvae. A mass rearing system for Artemia is included.

319. Rollefsen, G. 1939. Artificial rearing of fry of sea water fish. Preliminary communication. Rapp. Cons. Explor. Mer. 109(3): 133-134.

Pleuronectes platessa

First paper to show Artemia salina (Brine shrimp) are easily reared as food for fish larvae. Also reared Pleuronectes platessa - P. psuedoflesus hybrids.

320. Ronald, K. 1957. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. I. Echinorhynchus laurentianus sp. nov. (Acanthocephala: Echinorhynchidae). Can. J. Zool. 35(3): 437-439.

321. _____. 1958a. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. III. Copepoda parasitica. Can. J. Zool. 36(1): 1-6.

322. _____. 1958b. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. IV. Cestoda. Can. J. Zool. 36(3): 429-434.

323. _____. 1959. A check list of the metazoan parasites of the Heterosomata. Dept. Fish. Quebec. Contrib. 67: 1-152.

324. _____. 1960. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. VI. Digenea. Can. J. Zool. 38(5): 923-937.

325. _____. 1963. The metazoan parasites of the Heterosomata of the Gulf of St. Lawrence. VII. Nematoda and Acanthocephala. Can. J. Zool. 41(1): 15-21.

326. Rothschild, B.J. and E.E. Deubler, Jr. 1960. Paralichthys squamilentus (Jordan and Gilbert) from North Carolina. Copeia. 1960(3): 254-255.

327. Rout, W.R. 1965. Intestinal transport of amino-acids and glucose in flounder fish. Proc. Soc. Exp. Biol. Med. 118(4): 933-938.

Using everted intestinal sac of Pseudopleuronectes americanus: L-tyrosine, D-tyrosine, m-tyrosine, o-tyrosine, 3-amino-tyrosine, 3.5-dichloro-tyrosine, and 3.4-dihydroxyphenyalanine, L-tryptophan were transported against a concentration gradient. Glucose, 3.5-dibromo- and 3.5 dinitro-tyrosine, D. tryptophan and tryptamine were not transported against a concentration gradient.

328. Rustad, D. 1960. Improved rearing of young plaice (Pleuronectes platessa L.) by application of penicillin. K. Norski Vidensk. Selskab, Forhandl. (Trondheim) 33(1): 1-4.

10^5 units penicillin per 15 liter water increased survival significantly.

329. Ryland, J.S. 1964. The feeding of plaice and sand-eel larvae in the southern North Sea. J. Mar. Biol. Ass. U.K. 44(2): 343-364.

Pleuronectes platessa larvae feed during daylight hours and consume mainly appendicularians.

330. _____. 1966. Observations on the development of larvae of the plaice, Pleuronectes platessa L., in aquaria. J. Cons. Perm Int. Explor. Mer. 30(2): 177-195.

331. _____ and J.H. Nichols. 1967. Effect of temperature on the efficiency of growth of plaice prolarvae. Nature 214: 529-530.

Data indicated an optimum temperature for yolk utilization to produce maximal growth; this temperature may be different from the temperature producing maximum growth per unit time.

332. Saila, S.B. 1961a. The contribution of estuaries to the offshore winter flounder fishery in Rhode Island. Proc. Gulf and Carib. Fish Inst. 14th Ann. Session: 95-109.

Pseudopleuronectes americanus fed heavily inshore and moved offshore where they contributed largely to the offshore fishery.

333. _____. 1961b. A study of winter flounder movements. Limnol. and Oceanogr. 6(3): 292-298.

Tag recovery used in analysis of movement of winter flounder.

334. _____. 1962. Proposed hurricane barriers related to winter flounder movements in Narragansett Bay. Trans. Am. Fish. Soc. 91(2): 189-195.

Pseudopleuronectes americanus

Data indicates that proposed hurricane barriers will not act as physical barriers to migrating Pseudopleuronectes americanus.

335. Salah El-Din El-Zarka. 1963. Acclimatization of Solea vulgaris (Linn.) in Lake Quarun, Egypt. J. Cons. Int. Explor. Mer. 28: 126-136.

336. Saxen, P.K. and R.K. Rastogi. 1968. The cranial nerves of the flatfish, Cynoglossus bilineatus (Lac). Annot. Zool. Jap. 41(2): 70-76.

Cranial nerves of C. bilineatus are asymmetrically disposed; each is discussed.

337. Schlieper, C. 1968. High pressure effects on marine invertebrates and fishes. Mar. Biol. (Berlin). 2(1): 5-12.

338. Scott, G.T. 1965. Physiology and pharmacology of color change in the sand flounder, Scopthalamus aquosus. Limnol. Oceanog. 10(supp): R230-R246.

Scophtalmus aquosus Norman (or Lophosetta maculata, Gill). Several drugs were used to cause pigment changes in the sand flounder. Arometic ethyl amines or hydrazines were very active. Data suggests catechol amine acts as a transmitter at concentrating nerve fiber endings.

339. Scott, R. and H.C. Bennet-Clark. 1963. Fluorescent lighting in biological research. Nature (London). 193: 1321-1322.

340. Scott, W.C.M. 1929. A note on the effect of temperature and salinity on the hatching of eggs of the winter flounder (Pseudopleuronectes americanus Walbaum). Contrib. Can. Biol. 4(11): 137-141.

Varying salinities at 4-5° C. produced negligible differences in rate and percentage of hatching eggs.

341. Shatunovskii, M.I. 1963a. On the discovery of a hybrid between the marine flounder, Platessa platessa (L.) and the river flounder, Pleuronectes flesus (L.) in the eastern part of the Baltic Sea. Vopr. Ikhtiol. 3(1): 184-186.

First of such hybrid to appear in Soviet literature.

342. _____. 1963b. Dynamics of fat and water content and gonads in the Baltic river flounder (Pleuronectes flesus Linne) and its relation to features of gonad maturation. Vop Ikhtiol 3(4): 652-667.

343. _____. 1963c. Some characteristics of fat and water metabolism of flounder in Kandalaksha Bay of the White Sea. Zool. Zhur. 42(6): 870-876, (English summary).

Fat content of flounder is related to the spawning period - fat content is high in the gonads with ripening.

344. _____. 1965. Characteristics of the growth of the flounder, Pleuronectes flesus, in the eastern part of the Baltic Sea. Cop. Ikhtiol 5(3): 518-531.

345. _____. 1969. Comparative study of blood serum lipids of cod, navaga, fluke and Arctic flounder of the White Sea. Doklady Bicl. Sci. 184(1-6): 12-14.

346. Shelbourne, J.E. 1953. The feeding habits of plaice postlarvae in the Southern Bight. J. Mar. Biol. Ass. U.K. 32: 149-161.

Pleuronectes platessa

Stomach content analysis of plaice post-larvae indicated heavy feeding on the tunicate Oikopleura dioica. Such feeding was shown to be highly light dependent.

347. _____. 1955. Significance of the sub-dermal space in pelagic fish embryos and larvae. Nature (London) 176: 743-744.

Pleuronectes platessa

Preliminary publication of information in Shelbourne, 1956.

348. _____. 1956a. The effect of water conservation on the structure of marine fish embryos and larvae. J. Mar. Biol. Ass. U.K. 35: 275-286.

Pleuronectes platessa

Supports existing theories of evolution of marine teleosts from freshwater ancestors, using egg structure as evidence.

349. _____. 1956b. The abnormal development of plaice embryos and larvae in marine aquaria. J. Mar. Biol. Ass. U.K. 35: 177-192.

Pleuronectes platessa

350. Shelbourne, J.E. 1957a. The feeding and condition of plaice larvae in good and bad plankton patches. J. Mar. Biol. Ass. U.K. 36: 539-552.

Pleuronectes platessa

It was shown that a lack of food was probably a limiting factor during some periods of the year which probably caused death and imbalance of osmoregulation.

351. _____. 1957b. Site of chloride regulation in marine fish larvae. Nature (London). 180: 920-922.

Pleuronectes platessa

Follow-up paper to Shelbourne, 1956.

352. _____. 1962. A predator-prey size relationship for plaice larvae feeding on Oikopleura. J. Mar. Biol. Ass. U.K. 42: 243-252.

353. _____. 1963a. Marine fish culture in Britain. II. A plaice rearing experiment at Port Erin, Isle of Man, during 1960, in open sea water circulation. J. Cons. Int. Ex. Mer. 28: 70-79.

Pleuronectes platessa

Early rearing techniques in open sea water system.

354. _____. 1963b. Marine fish culture in Britain. IV. High survivals of metamorphosed plaice during salinity experiments in open circulation at Port Erin, Isle of Man, 1961. J. Cons. Int. Explor. Mer. 28: 246-261.

Pleuronectes platessa

355. _____. 1963c. Rearing marine fish for commercial purposes. Calif. Coop. Oceanic Fish. Invest. Reports. 10: 7-1-62 to 6-30-63: 63pp.

Pleuronectes platessa

Excellent history of flatfish culture. Verbal description of development of plaice. Describes all his work to 1963.

356. Shelbourne, J.E. 1963d. A marine fish-rearing experiment using antibiotics. Nature (London) 198: 74-75.

Pleuronectes platessa

Found 50 I. U. sodium penicillin G. and .05 mg/ml streptomycin sulphate in static system significantly increased hatching percent of plaice eggs and viability of newly hatched larvae. Optimum incubation for plaice eggs is 6-7° C., shift to 7-8° C. facilitates first feeding, raise to 10-11° C. during 2nd six weeks of life decreases mortalities.

357. _____, J.D. Riley and G.T. Thacker. 1963. Marine fish culture in Britain. I. Plaice rearing in closed circulation at Lowestoft. 1957-1960. J. Cons. Int. Explor. Mer. 28: 50-69.

Pleuronectes platessa

Early plaice rearing techniques - closed circulation.

358. _____. 1964. The artificial propagation of marine fish. Adv. Mar. Biol. 2: 1-83. (Plaice p. 70-83).

Pleuronectes platessa

359. _____. 1968. Marine fish cultivation: Priorities and progress in Britain. In "Marine Aquaculture" W.J. McNeil (Ed.). Oregon State University Press. Corvallis, Oregon. 172pp.

Pleuronectes platessa
Solea solea

Excellent review of plaice culture system developed by Shelbourne, includes good overall view of the system.

360. Sick, K.O. Frydenberg and J.T. Nielsen. 1963. Haemoglobin patterns of plaice, flounder, and their natural and artificial hybrids. Nature 198(4878): 411-412.

Pleuronectes platessa
Platichthys flesus

361. Simidu, U., E. Daneko and K. Aiso. 1969. Microflora of fresh and stored flatfish, Kareius bicoloratus. Bull. Jap. Soc. Sci. Fish. 35(1): 77-82.

361. Continued

Changes in the bacterial flora of stored K. bicoloratus was studied. Skin flora was predominately Pseudomonas and Achromobacter while gill, gut and muscle flora was mainly Vibrio and Aeromonas.

362. Simpson, A.C.1951. Fecundity of plaice. Fish Invest. Lond. Series 2. 17(5): 27pp.

363. Simpson, A.C. 1959a. The spawning of the plaice (Pleuronectes platessa) in the Irish Sea. Fish Invest. Lond. Series 2. 22(8): 30pp.

364. _____. 1959b. The spawning of the plaice in the North Sea. Fish Invest. Lond. Series 2. 22(7): 111pp.

365. Smith, G.M. 1935. A hyperplastic epidermal disease in the winter flounder infected with Cryptocotyle lingua (Creplin). Am. J. Cancer. 25(1): 108-112.

366. Smith, R.M. 1969. The occurrence, dynamics and significance of chlorinated hydrocarbon residues in the tissue of winter flounder, Pseudopleuronectes americanus (Walbaum), from the Weweantic River estuary, Massachusetts (M.S. Thesis). 38pp. U. of Massachusetts.

367. _____ and C.F. Cole. 1970. Chlorinated hydrocarbon insecticide residue in winter flounder, Pseudopleuronectes americanus, from the Weweantic River estuary, Mass. Fish. Res. Bd. of Can. 27(12): 2374-2380.

Pseudopleuronectes americanus

Found residues of DDT, DDE, Heptachlor, Heptachlor epoxide in juvenile and adult winter flounder at similar levels. Ripening female flounder showed DDT and DDE concentration in their ovaries.

368. Smith, R.W. 1969. Analysis of the summer flounder, Paralichthys dentatus L., population in the Delaware Bay. U. of Del. (M.S. Thesis). 71pp.

369. Smith, W.G. and M.P. Fahay. 1970. Description of eggs and larvae of the summer flounder, Paralichthys dentatus. U.S. Fish and Wildl. Ser. Res. Rep. 75: 21pp.

370. Sohn, B.I., M.A. Steinberg. 1962. Effect of cooking methods on the sodium content of halibut, haddock and flounder. Fish. Indust. Res. 2(1): 7-13.

Order of most effective methods in removing sodium from tissue was boiling, steaming, broiling and baking.

371. Soin, S.G. 1970. Embryonic and larval development of the White Sea flounder (Pleuronectes flesus bogdanovi-Sandeberg). J. of Ichth. 10(4): 503-514.

First paper on development of the White Sea flounder. Gives reproductive and embryological information. Eggs fertilized by cod milt partially developed.

372. Solemdal, P. 1967. The effect of salinity on buoyancy, size and development of flounder eggs. Sarsia. 29: 431-442.

373. Stafford, J. 1904. Trematodes from Canadian fishes. Zool. Anz. Leipzig. 27: 481-495.

Pseudopleuronectes americanus was host of Stephanostomum hystrix and Steringophorus furciger.

374. Stauch, A. 1965. On the geographical distribution of Arnoglossus imperialis (Raf. 1810) and description of a new species, Arnoglossus blachei (Pisces, Teleostic, Heterostomata, Bothidae) Bull. Mus. Nat. Hist. Natur. 37(2): 252-260.

375. Steele, J.H. and R.R.C. Edwards. 1970. The ecology of O-group plaice and common dabs in Loch Ewe. IV. Dynamics of the plaice and dab populations. J. Exp. Mar. Biol. Ecol. 4(2): 174-187.

376. Steven, G.A. 1930. Bottom fauna and the food of fishes. J. Mar. Biol. Ass. U.K. 6(3): 677-698.

Pleuronectes microcephalus
Pleuronectes limanda
Pleuronectes platessa

Describes the feeding activity of these species and mentions some rather inconclusive stomach content analysis.

377. Stunkard, H.W. and F.E. Lux. 1965. A microsporidian infection of the digestive tract of the winter flounder, Pseudopleuronectes americanus. Biol. Bull. 129(2): 371-387.

Glugea microspora (identical to Nosema anomala (Moniez, 1877) found in many winter flounder from New England.

378. Sullivan, W.E. 1915. A description of the young stages of the winter flounder, Pseudopleuronectes americanus (Walbaum). Trans. Am. Fish. Soc. 44(2): 125-136.

379. Summer, F.B. 1906a. The osmotic relations between fishes and their surrounding medium (Preliminary note). Biol. Bull. 10(6): 298-306.

380. _____. 1906b. The physiological effects upon fishes of changes in density and salinity of water. Bull. U.S. Bur. Fish. 25 (for 1905): 53-108.

Pseudopleuronectes americanus died within 2 days after being transferred from salt to fresh water.

381. _____. 1911. The adjustment of flatfishes to various backgrounds: A study of adaptive color change. J. Exp. Zool. 10(4): 409-505.

382. Sumner, F.B. and A.B. Keys. 1934. The effects of differences in the apparent source of illumination upon the shade assumed by a flatfish on a given background. James Johnstone Memorial Volume. The Univ. of Liverpool.

Good review of papers concerning color changes in flatfish.

383. Tagatz, M.E. and D.L. Dudley. 1961. Seasonal occurrence of marine fishes in four shore habitats near Beaufort, N.C., 1957-1960. U.S. Fish. Wildl. Ser. Spec. Sci. Rep. Fish. 390: 1-19.

Several species of Atlantic flatfish.

384. Tan, E.O. 1960. Contribution to the investigations on the osmoregulation in fish eggs. Phil. J. Fish. 8(1): 59-69.

385. Thompson, W.F. and R. Van Cleve. 1936. Life history of the Pacific halibut. II. Distribution and early life history. Rep. International Fish. Commission 9: 183pp.

Hippoglossus stenolepis

386. Topp, R.W. 1965. An annotated bibliography of the winter flounder (Pseudopleuronectes americanus Walbaum). 30pp. Mass. Dept. Mar. Fisheries. Boston, Mass.

An excellent review of the literature on the winter flounder through early 1965 - 347 entries covering the life history, distribution, systematics physiology and both commercial and sport fisheries are included.

387. _____. 1968. An estimate of fecundity of the winter flounder, Pseudopleuronectes americanus (mathematical model). J. Fish. Res. Bd. Can. 25(6): 1299-1302.

388. Torchio, M. 1961a. Contribution to the knowledge of some fish forms from the Ligurian Sea II. Natura (Milan) 100(3): 225-256.

389. _____. 1961b. The sexual dimorphosim of the Bothidae of the Mediterranean Sea. Natura (Milan) 52(3): 92-104.

390. _____. 1961c. Soleidae from the Ligurrian Sea (Pisces: Pleuronectiformes). Boll. Pesca Piscicolt. e Idrobiol. 16(1): 152-155. English and French summary.

391. _____. 1961d. Systematic and ecological notes on the Arnoglossus of the Ligurian Riveria dr. Ponenti. Natura (Milan) 52(4): 123-133.

392. Townsley, P.M. and M. Scott. 1963. Systaltic muscular action of the kidney tubules of flounder. J. Fish. Res. Bd. Can. 20(1): 243.

Pseudopleuronectes americanus

393. Trautner, K. 1963. On the distribution of glycogen in some flatfish species and the relation between the glycogen content and the sex of the fishes. Veroffentl. Inst. Meeresforsch. Bremerhaven 8(2): 179-185.

Pleuronectes flesus

Glycogen content is less in tissue of the upper side of three species of flatfish than lower side and is higher in musculature of posterior body than anterior. Male Pleuronectes flesus have more glycogen then females.

394. Trump, B.F. and F.L. Ginn. 1968. Studies of cellular injury in isolated flounder tubules: II Cellular swelling in high potassium media. Lab. Invest. 18(4): 344-351.

Ultrastructure changes due to cellular swelling caused by replacement of extra-cellular Na with K is discussed. Observations are discussed and related to the general problem of cell volume regulation. Differing rates of organelle swelling following injury may be explained by differing permeabilities of compartments within each cell.

395. _____ and R.E. Bulger. 1968a. Studies of cellular injury in isolated flounder tubules: III. Light microscopic and functional changes due to cyanide. Lab. Invest. 18(6): 721-730.

Cytologic changes in flounder tubules due to exposure to lethal concentrations of cyanide are discussed.

396. _____. 1968b. Studies of cellular injury in isolated flounder tubules: IV. Electron microscopic observations of changes during the phase of altered homeostasis in tubules treated with cyanide. Lab. Invest. 18(6): 731-739.

397. Tunbridge, B.R. 1968. Growth and movements of tagged flatfish in Tasman Bay. N.Z. Mar. Dep. Fish. Tech. Rep. 13: 1-15.

Results showed a definite inshore movement of flatfish and a rapid growth rate in early summer.

398. Tyler, A.V. 1971. Surges of winter flounder, Pseudopleuronectes americanus into the intertidal zone. J. Fish. Res. Bd. Can. 28(11): 1727-1732.

Pseudopleuronectes americanus

Peak onshore movement occurs 2-2½ hrs. after low tide and subsides about 3½ hrs. after tide begins to rise. Peak offshore movement (to sublittoral) is at 2½ to ½ hour before low tide. Intertidal zone is major feeding area for northern P. americanus W.

399. Umminger, B.L. 1970. Effects of subzero temperatures and trawling stress on serum osmolality in the winter flounder, Pseudopleuronectes americanus. Biol. Bull. 139(3): 574-579.

399. Continued

Winter flounder survived temperatures of -1.5° C. Serum osmolality of freshly caught flounder increased with time and was higher than that of laboratory acclimated fish at the same temperatures.

400. Verheijen, F.J. and S.J. DeGroot. 1967. Diurnal activity pattern of plaice and flounder (Pleuronectidae) in aquaria. Neth. J. Sea Res. 3(3): 383-390.

Pleuronectes platessa

Under normal lighting conditions plaice and flounder feed near the bottom during the day while during the night much additional swimming off the bottom was recorded.

401. Volya, G.S. 1966. Some observations on the digestive enzymes of the Black Sea fishes with a note on a micromodification of determinations of trypsin, amylase and lipase. Fiziologiya moiskikh zhivotnykh (Physiology of marine organisms) Nauka: Moscow. 137-145. From Ref. ZH Biol., 1966, No. 111141 (Translation).

Platichthys flesus

Pepsin was found in the flounder stomachs. The activity of trypsin, amylase and lipase was determined in several portions of the flounder digestive system.

402. von Ubisch, L. 1952. Untersuchungen uber Pleuronectiden. II. (Ambicoloration; Inversion and Bilateralitet). Arch. EntwMech. Org. 145: 1-61.

403. von Westernhagen, H. 1970. Rearing the eggs of cod (Gadus morhua), flounder (Pleuronectes flesus) and plaice (Pleuronectes platessa) under combined temperature and salinity conditions. Helg. Wiss. Meer. 21: 21-102. In German with English Abstract.

Pleuronectes flesus eggs developed best at 4° C. and 33 o/oo sal. Pleuronectes platessa eggs developed best at 6° C. and 20 o/oo sal. Less than ideal conditions led to increased morphological anomalies and lower percentage hatch.

404. Vorzimmer, P.J. 1971. Darwin's "Lamarckism" and the "Flatfish Controversy" (1863-1871). Lychnos. Laerdomshist Samf. Arab. 1969-1970: 121-170.

Narrative on the great debate between Darwin and Lamarck on the evolutionary significance of changes in the structure of the flatfish.

405. Wada, K. 1970a. Studies on the population biology of the flatfish, Limanda herzensteini Jordan et Snyder in Niigata Region. I. Age and Growth. Bull. Jap. Sea Reg. Fish Res. Lab. 22: 31-43 (English summary).

Age and growth is determined on nearly 1300 specimens of L. herzensteini using otolith as age indicators.

406. _____. 1970b. Studies on the population biology of the flatfish, Limanda herzensteini Jordan et Snyder in Niigata Region. II. Maturity and spawning. Bull. Jap. Sea. Reg. Fish. Res. Lab. 22: 44-57 (English summary).

Gonads of 598 L. herzensteini were examined. Spawning season was found to be from late February to early May with a peak in March and April.

407. Wallace, N.A. 1919. The Isopoda of the Bay of Fundy. Unive. Toronto Studies, Biol. Ser. 18(1919). Studies from the Biological Station., Biol. Bd. Can. 1: 1-42.

The isopod, Gnathia elongata, was found on a winter flounder (Pseudopleuronectes americanus).

408. Walters, V. 1961. Is flatfish asymmetry transmitted cytoplasmically? Copeia 1961(4): 485-486.

Data indicates flatfish asymmetry is transmitted by maternal influence, cytoplasmic inheritence or may be a threshold effect. Genetic factors probably do not determine symmetry.

409. Wardle, C.S. 1971. New observations on the lymph system of the plaice, Pleuronectes platessa and other teleosts. J. Mar. Biol. Ass. U.K. 51(4): 977-990.

410. Wasserman, K., E.L. Becker and A.P. Fishman. 1953. Transport of phenol red in the flounder renal tubule. J. Cell. and Comp. Physiol. 42(3): 385-393.

Pseudopleuronectes americanus

411. Wellings, S.R. and R.G. Chuinard. 1965. Epidermal papillomas with virus-like particles in flathead sole, Hippoglossoides elassodon. Science 146(3646): 932-934.

412. _____, R.G. Chuinard and M. Bens. 1965. A comparative study of skin neoplasms in four species of pleuronectid fishes. In: Symposium on viral diseases of poikilothermic vertebrates; Kearneysvill, W. Va. 23-26 September, 1964. Ann. N.Y. Acad. Sci. 126(1): 479-501.

Parophyrs vetulus
Glyplocephalus zachirus
Hippoglossoides elassodon
Psettichthys melanostictus

413. _____, R.G. Chuinard, R.T. Gourley and R.A. Cooper. 1964. Epidermal papillomas in the flathead sole, Hippoglossoides elassodon, with notes on the occurence of similar neoplasms in other pleuronectids. J. Nat. Cancer Inst. 33(6): 991-1004.

414. Westman, J.R. 1946. Some studies on the life history and economics of the fluke (Paralichthys dentatus) of Long Island waters. An investigation conducted jointly by the state of N.Y. Cons. Dept.; the U.S. Fish and Wildlf. Serv. and the town of Islip, N.Y. 1-15.

415. Westrheim, S.J. 1963. Results from tagging a spawning stock of Dover sole, Microstomus pacificus. Pacif. Mar. Fish. Comm. Bull. 6: 14-21.

416. White, J.C. Jr. 1962. A reversed ambicolorate post-larval Gulf flounder. Copeia. 4: 854.

Paralichthys albigutta

417. _____ and D.E. Hoss. 1964. Another record of incomplete ambicoloration in summer flounder, Paralichthys dentatus. Ches. Sci. 5(1): 151-152.

418. Whitley, E. 1906. A note on the effect of acid, alkali and certain indicators in arresting or otherwise influencing the development of the eggs of Pleuronectes platessa and Echinus esculentus. Proc. Royal Soc. London. Ser. B. 77: 137-149.

Pleuronectes platessa eggs tolerate very little variation from normal concentrations in hydrogen or hydroxyl ions. It appears that they are able to withstand a wider variation of hydroxyl ions than hydrogen.

419. Wilhelm, R. 1969. Comparative studies of nervous control in colour change of fishes. Z. Vergl. Physiol. 65(2): 153-190. (English summary).

Solea solea
Rhomboidichthys podas
Pleuronectes platessa

Transmission of nerve impulse was cholinergic at the sympathetic ganglia level and adrenergic at the level of the chromatophores. Dispersion and contraction of pigment melanophores in response to light is studied and the effect of electrical stimulation and temperature is noted.

420. Wilkens, E., P.H. and R.M. Lweis. 1971. Occurrence of reversal and staining in North Carolina flounders. Ches. Sci. 12(2): 115-116.

Six Ancylopsetta quadrocellata (Gill) with pigmented blind sides, a reversed bay wiff. Citharichthys spilopterus (Gunther) are reported.

421. Williams, A.B. and E.E. Deubler Jr. 1968. A ten-year study of meroplankton in North Carolina estuaries: Assessment of environmental factors and sampling success among both flounders and penaeid shrimps. Ches. Sci. 9: 27-41.

Postulate that light intensity may influence catch of Paralichthys sp as well as salinity, temperature, current velocity and wind direction.

422. Williams, S.R. 1902. Changes accompanying the migration of the eye and observations on the tractus opticus and tectum opticum in Pseudopleuronectes americanus. Bull. Mus. Comp. Zool. 40: 1-58.

A detailed description of anatomical changes taking place during metamorphosis in the winter flounder.

423. Wilson, C.B. 1905. The fish parasites of the genus Argulus found in the Woods Hole region. Bull. U.S. Fish. Comm., 24(for 1904): 115-131.

The copepods Argulus laticauda and A. megalops were found on the winter flounder. Parasites of other flatfish are listed.

424. Wolfgang, R.W. 1954a. Studies of the trematode Stephanostomum baccatum (Nicoll, 1907): I. The distribution of the metacercaria in eastern Canadian flounder. J. Fish. Res. Bd. Can. 11(6): 954-962.

Pseudopleuronectes americanus was found to be an important host and was often found infected heavily.

425. _____. 1954b. Studies of the trematode Stephanostomum baccatum (Nicoll, 1907). II. Biology, with special reference to the stages affecting the winter flounder. J. Fish. Res. Bd. Can. 11(6): 963-987.

426. Wood, Chris, M. & D.J. Randall. 1971. The effect of anaemia on ion exchange in the southern flounder (Paralichthys lethostigma) Comp. Biochem. Physiol. 39(3A): 391-402.

The Na efflux rate was reduced over 20% in P. lethostigma that had become anaemic by bleeding after catheterization.

427. Wood, J.D. 1958. Nitrogen excretion in some marine teleosts. Can. J. Biochem. Physiol. 36(12): 1237-1242.

Platichthys stellatus

4/5 nitrogenous material excreted via the gills with ammonia and urea being the main excreta.

428. Wood, P.C. 1961. The principles of water sterilisation by ultra-violet light and their application in the purification by oysters, Ministry of Agriculture, Fisheries and Food, London, Fishery Investigations, Ser. 2 23(6): 48pp.

429. Woolcott, W.S., C. Beirne and W.M. Hall Jr. 1968. Descriptive and comparative osteology of the young of three species of flounder, Genue Paralichthys. Chesapeak Science. 9(2): 109-120.

429. Continued

Paralichthys dentatus
P. lethostigma
P. albigutta

430. Yanulov, K.P. 1963. Age and growth of the American plaice (Pleuronectidae) in the Northwest Atlantic. In: Yu. Y.M. (Editor) Soviet Fisheries Investigations in the Northwest Atlantic (Translation). Office of Technical Services, U.S. Dept. of Comm. Washington 25, D.C.: 355-360.

431. Yazdani, G.M. 1969. Adaption in the jaws of flatfish (Pleuronectiformes) J. Zool. (London). 159(2): 181-222.

Adaption of jaws and associated musculature of 18 species of flatfish were found. Adaptions to different modes of feeding were found.

432. Zaitsev, Y.P. 1957. The effect of the salinity of the water on the development of the roe of the flounder Pleuronectes flesus luscus Pallas. Doklady. Akad. Nauk. SSSR. 105(6): 1364-1367.

Roe of P. flesus from the Khadhibeevsk estuary does not develop normally in waters of the Black Sea.

433. Zemskaya, K.A. 1960. The stock of flounder in the central Baltic. Ann. Biol. 17: 117-118.

SUBJECT INDEX

SUBJECT INDEX

Physiology and Metabolism (continued)

Metabolism
94, 144, 187, 211, 226, 342, 343, 427
Osmoregulation
150, 152, 153, 158, 347, 348, 351, 379, 380, 384
Respiration
289
Other
28, 120, 151, 190, 302, 304, 327, 338, 392, 394, 395, 426

Pigmentation

See "Abnormalities - Pigmentation" and "Color Change".

Pollutants Effects on Flatfish

Chlorinated Hydrocarbon
39, 104, 105, 243, 366, 367
Oil
161, 241
Radioactive Compounds
111, 166, 167, 176, 279, 302
General
192

Pressure

See " Effects of Environmental Factors - Pressure".

Respiration

See "Physiology of Metabolism".

Reproduction

See "Sexual Development and Reproduction".

Reversed Flatfish

See "Abnormalities - Reversal".

Salinity

See "Effect of Environmental Factors - Salinity".

SPECIES INDEX

SPECIES INDEX

Atheresthes

A. evermanni Jordan and Starks
(Kamchatka flounder)
143
A. stomias (Jordan and Gilbert)
(Arrow-tooth flounder)
130, 282

Bothus myriaster Temminck and Schlegel
6

Brachirus sp.
99

Citharichthys

C. amblybregmatus
141
C. gilberti
85
C. gymnorhinus
141
No species or more than 1 species included
140

Cleisthenes herzensteini

(Sohachi flounder)
283

Cynoglossus

C. bilineatus Lac
336
No species or more than one included
99

Cyclopsetta

C. chittendeni Bean
(Mexican flounder)
C. fimbriata Goode and Bean
(Spotfin flounder)
142

Trinectes maculatus (Block and Schneider)
(Hog Choker)
60, 61, 140, 383

Xystreurys liolepis Jordan and Gilbert
(Fantail sole)
288