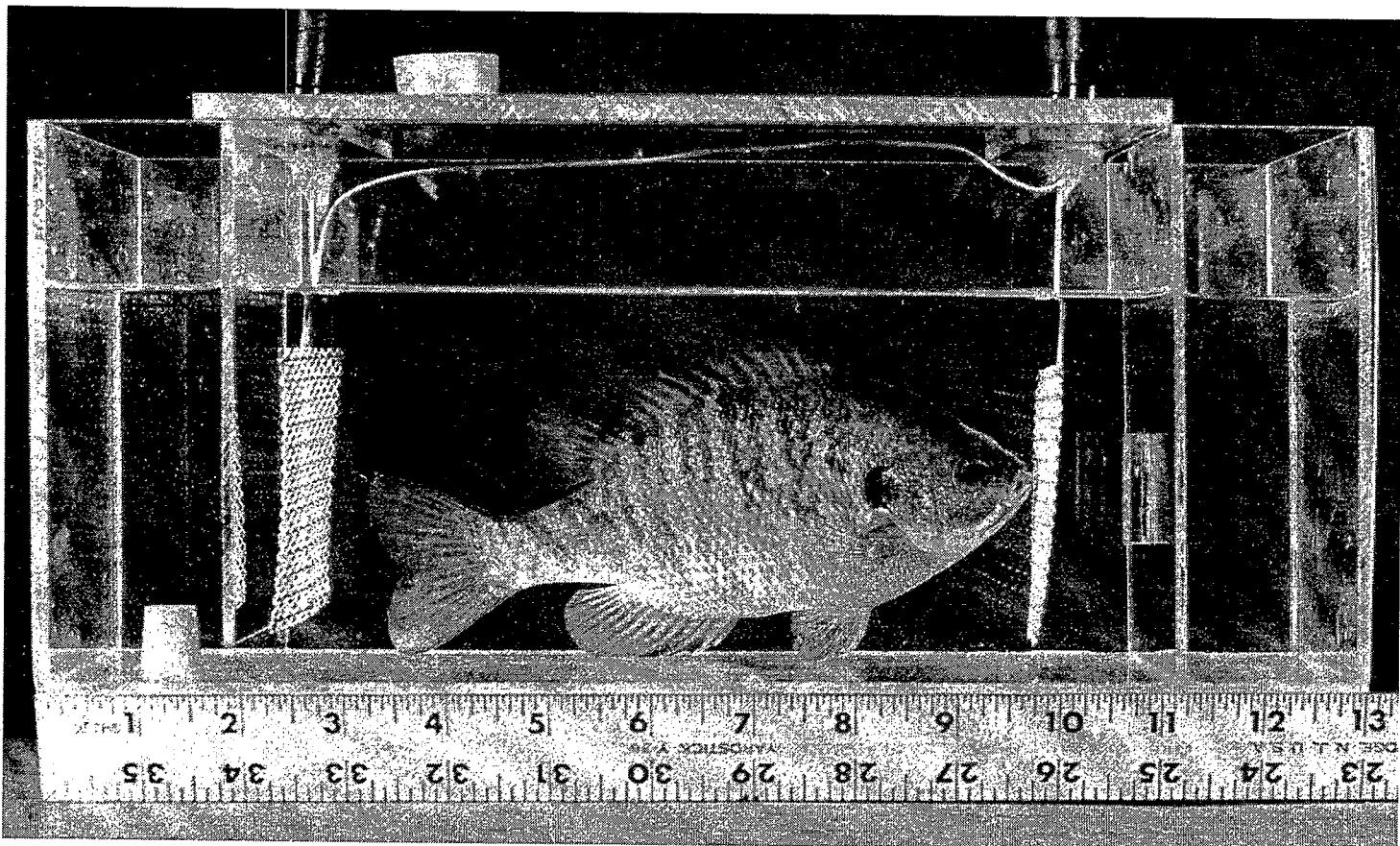
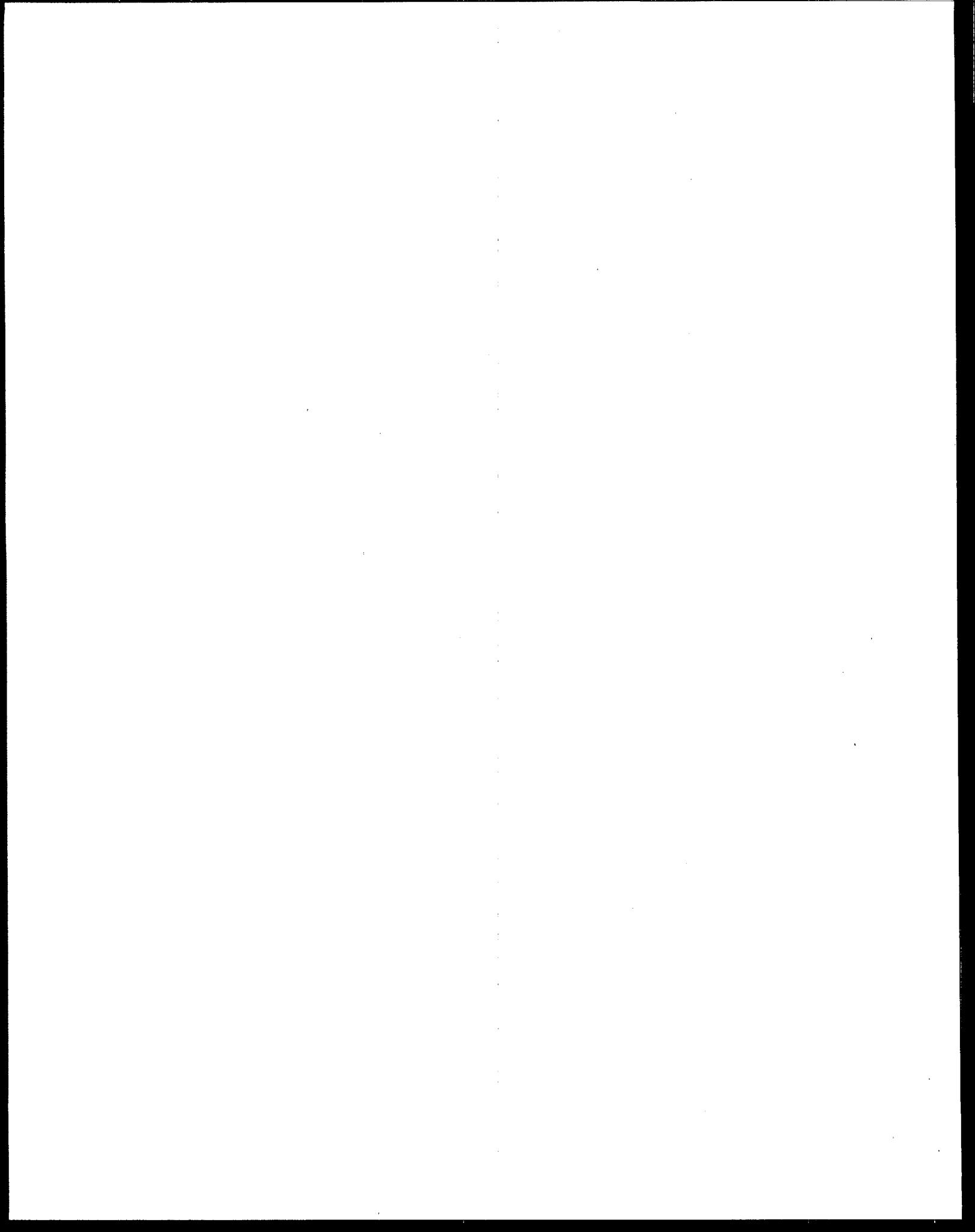


# Aquatic Animal Respiration and Cough Response Applied to Innovative Environmental Biomonitoring:

## A Bibliography





**AQUATIC ANIMAL RESPIRATION AND COUGH RESPONSE APPLIED TO  
INNOVATIVE ENVIRONMENTAL BIOMONITORING: A BIBLIOGRAPHY**

By

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## **NOTICE**

This document has been reviewed in accordance with U.S. Environmental Protection Agency policy and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

## PREFACE

This bibliography encompasses a body of in-depth technical information on the mechanics and physiology of respiration in aquatic animals (vertebrate and invertebrate). In compiling the bibliography, special emphasis was given to identifying studies that deal with responses of this sensitive physiological system to environmental stressors. Furthermore, studies describing how ventilation and cough response physiology have been incorporated into innovative telemetry and biomonitoring techniques for use in environmental monitoring and protection were of particular interest. In addition, there are a few papers included that deal with the biochemical and cardiovascular aspects of the respiratory process, but in most cases these demonstrate an inter-relationship with branchial ventilatory and cough response mechanics.

This bibliography was meticulously compiled over a 25 year period by Mr. Richard W. Carlson (Research Aquatic Biologist, retired, 1998). Due to the nature and extent of the literature describing the use of ventilatory and cough responses in biomonitoring for pollution control, the colleagues of Mr. Carlson at the Mid-Continent Ecology Division felt it was important to make this excellent bibliography available to others. This bibliography is especially useful given the continued importance of biomonitoring in determining the impacts of point and non-point source pollution on surface waters and in judging the success of sewage and industrial waste treatments.

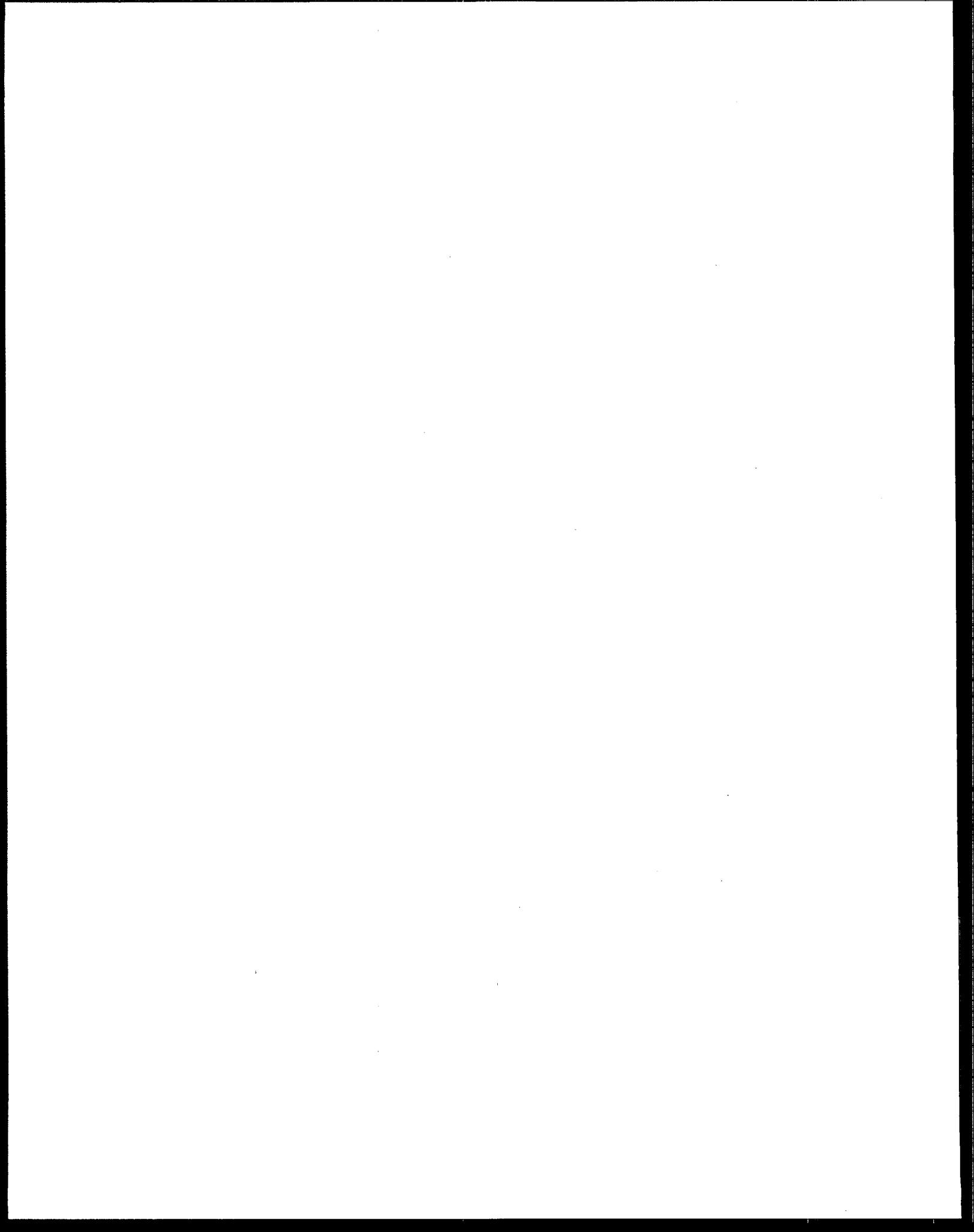
The bibliography contains 857 citations through 1998 covering published journal articles, symposia, book chapters, books and government reports. The citations are arranged in alphabetical order by author and year. An indexed author list, keyword list, and taxon list are included to assist in locating specific information. A wide variety of library abstracting services were available and used in compiling this comprehensive bibliography.

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## BIBLIOGRAPHY OF RESEARCH REPORTS

1. Al-Akel, A.S. and M.J.K. Shamsi. 1988. *Oreochromis niloticus* (Cichlidae: Perciformes): Behavioural responses imputed by the contamination of water with  $HgCl_2$  and  $ZnSO_4$ . *J. Biol. Sci. Res.* **19**(Suppl.):949-956.  
{Keys:  $HgCl_2$ / Ventilation/  $ZnSo_4$ }
2. Alexander, R.McN. 1967. Functional design in fishes. *Hutchinson & Co., London.* 160 pp.  
{Keys: Ventilation}
3. Alikin, Y.S., V.A. Matyukin and A.Y. Stolbov. 1982. Some patterns of active metabolism in fish and the mechanisms involved. [Nekotorye zakonomernosti aktivnogo obmena i mechanizmy ego obespecheniya u rybe]. *Zh. Obschch. Biol.* **43**(2):219-28. [Russian].  
{Keys: Grayling/ Metabolism/ Swimming/ Temperature/ *Thymallus sp.*/ Ventilation}
4. Alkahem, H.F. 1994. The toxicity of nickel and the effects of sublethal levels on haematological parameters and behaviour of the fish (*Oreochromis niloticus*). *J. Univ. Kuwait (Sci.)* **21**(2):243-252.  
{Keys: Behavior/ Blood/ Cough/  $LC_{50}$ / Metal/ Ni/ Swimming/ Yawn}
5. Ambrose, A.M. 1942. Some toxicological and pharmacological studies on 3, 5-dinitro-o-cresol. *J. Pharmacol. Exptl. Therap.* **76**:245-250.  
{Keys: Rat/ Uncoupler}
6. Amend, J.F., L.A. Geedes and H.E. Hoff. 1970. Recording of respiration by electrical impedance change from the dogfish in sea water. *Med. Biol. Eng.* **8**:145-48.  
{Keys: Attached electrodes/ Impedance technology/ Seawater/ *Squalus sp.*/ Ventilation}
7. Anker, G.Ch., J. Simons and P. Dullemeijer. 1997. An apparatus for direct X-ray cinematography exemplified by analysis of some respiratory movements in *Gasterosteus aculeatus*. *Experientia.* **23**:74-75.  
{Keys: Stickleback/ Ventilation/ Video}
8. Anker, G.Ch. 1974. Morphology and kinetics of the head of the stickleback (*Gasterosteus aculeatus*). *Trans. Zool. Soc. Lond.* **32**:311-416.  
{Keys: Ventilation}
9. Anker, G.Ch. 1978. Analyses of respiration and feeding movements of the three-spined stickleback (*Gasterosteus aculeatus* L.). *Neth. J. Zool.* **28**:(3-4):485-523.  
{Keys: Feed/ Spit/ Ventilation/ Video}

10. Ansell, A.D. 1973. Changes in oxygen consumption, heart-rate, and ventilation accompanying starvation in the decapod crustacean (*Cancer pagurus*). *Neth. J. Sea Res.* **17**:455-475.  
 {Keys: Invertebrate/ Ventilation/ VO<sub>2</sub>}
11. Arunachalam, S., K. Jeyalakshmi and S. Aboobucker. 1980. Toxic and sublethal effects of carbaryl on a freshwater catfish (*Mystus vittatus* Bloch). *Arch. Environ. Contam. Toxicol.* **9**(3):307-316.  
 {Keys: AChE/ Carbamate/ Feed/ Metabolism/ Pesticides/ Ventilation}
12. Atchison, G.J., M.G. Henry and M.B. Sandheinrich. 1987. Effects of metals on fish behavior: A review. *Environ. Biol. F.* **18**(1):11-25.  
 {Keys: Activity/ Avoidance/ Behavior/ Cough/ Feed/ Metal/ Review/ Swimming/ Ventilation}
13. Babak, E. 1921. Die Mechanik und Innervation der Atmung. *Handbuch der vergleichenden Physiologie*. **1**:263-1027. Jena, Verlag von Gustav Fischer.  
 {Keys: Review/ Ventilation}
14. Babiker, M.M. 1979. Respiratory behavior, oxygen consumption and relative dependence on aerial respiration in the African lungfish (*Protopterus annectens* Owen) and an air breathing teleost (*Clarias lazera* C) *Hydrobiologia* **65**(2):177-187.  
 {Keys: Air breathing/ Blood/ CO<sub>2</sub>/ Hypoxia/ O<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation/ Visual/ VO<sub>2</sub>}
15. Babu, S.B.R., B. Jayasundaramma and R. Ramamurthi. 1986. Behavioral abnormalities of juveniles of the fish (*Cyprinus carpio*) exposed to methyl parathion. *Environ. Ecol.* **4**(1):95-97.  
 {Keys: Behavior/ Pesticides/ Ventilation}
16. Baden, S. and L. Hagerman. 1981. Ventilatory responses of the shrimp (*Palaemon adspersus*) to sublethal concentrations of crude oil extract. *Mar. Biol.* **63**(2):129-133.  
 {Keys: Attached electrodes/ Gill damage/ Impedance technology/ Invertebrate/ Nervous system/ Oil/ Seawater/ Ventilation}
17. Baglioni, S. 1907. Der Atmungsmechanismus der Fische. Ein Beitrag zur vergleichenden Physiologie des Atemrhythmus. *Z. Allg. Physiol.* **7**:177-282.  
 {Keys: Ventilation}
18. Baglioni, S. 1910. Zur vergleichenden Physiologie der Atembewegungen der Wirbeltiere. *Ergeb. Physiol.* **9**:90-137.  
 {Keys: Ventilation}

19. Bakthavathsalam, R. 1986. Effects of carbofuran on the dissolved oxygen consumption, opercular movements and survival of the fish (*Lepidocephalichthyes thermalis*) under complete submerged condition. *Environ. Ecol.* **4**(3):400-404.  
{Keys: Air breathing/ Ventilation/ VO<sub>2</sub>}
20. Baldwin, I.G., M.M.I. Harman and D.A. Neville. 1994. Performance characteristics of a fish monitor for detection of toxic substances. 1. Laboratory trials. *Water Res.* **28**(10):2191-2199.  
{Keys: LC<sub>50</sub>/ *Oncorhynchus sp.*/ Trout/ Ventilation frequency (fv)}
21. Ballintijn, C.M. and G.M. Hughes. 1965. The muscular basis of the respiratory pumps in the trout. *J. Exp. Biol.* **43**:349-362.  
{Keys: Buccal/ Electromyogram (EMG)/ Morphology/ Pressure/ Ventilation/ Video}
22. Ballintijn, C.M. 1968. *The respiratory pumping mechanism of the carp (Cyprinus carpio L.)*. Ph.D. Thesis. University of Groningen. 98 pp.  
{Keys: Cough/ Morphology/ Pressure/ Ventilation/ Video}
23. Ballintijn, C.M. 1969. Functional anatomy and movement coordination of the respiratory pump of the carp (*Cyprinus carpio L.*). *J. Exp. Biol.* **50**:547-567.  
{Keys: Electromyogram (EMG)/ Morphology/ Ventilation}
24. Ballintijn, C.M. 1969. Muscle coordination of the respiratory pump of the carp (*Cyprinus carpio L.*). *J. Exp. Biol.* **50**:569-591.  
{Keys: Cough/ Electromyogram (EMG)/ Morphology/ Pressure/ Trout/ Ventilation/ Video}
25. Ballintijn, C.M. 1969. Movement pattern and efficiency of the respiratory pump of the carp (*Cyprinus carpio L.*). *J. Exp. Biol.* **50**:593-613.  
{Keys: Electromyogram (EMG)/ Morphology/ Pressure/ Trout/ Ventilation/ Video}
26. Ballintijn, C.M. 1969. The influence of proprioception upon respiratory neurons in the medulla oblongata of fishes. *Acta Physiol. Pharmacol. Neerl.* **15**:25-26.  
{Keys: Brain/ Nervous system/ Succinyl/ Ventilation}
27. Ballintijn, C.M. 1972. Efficiency, mechanics and motor control of fish respiration. *Respir. Physiol.* **14**:125-141.  
{Keys: Brain/ Electromyogram (EMG)/ Nervous system/ Pressure/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
28. Ballintijn, C.M. and O.S. Bamford. 1975. Proprioceptive motor control in fish respiration. *J. Exp. Biol.* **62**:99-114.  
{Keys: Brain/ Carp/ *Cyprinus sp.*/ EEG/ Electromyogram (EMG)/ Morphology/ Nervous system/ Ventilation}

29. Ballintijn, C.M. and J.L. Roberts. 1976. Neural control and proprioceptive load matching in reflex respiratory movements of fishes. *Fed. Pro.* **35**(9):1983-1991.  
{Keys: Brain/ Carp/ Cough/ *Cyprinus sp.*/ EEG/ Electromyogram (EMG)/ Morphology/ Nervous system/ Succinyl/ Swimming/ Ventilation}
30. Ballintijn, C.M. and G.M. Alink. 1977. Identification of respiratory motor neurons in the carp and determination of their firing characteristics and interconnections. *Brain Res.* **136**:261-276.  
{Keys: Brain/ Carp/ Cough/ EEG/ Electromyogram (EMG)/ Nervous system/ Ventilation}
31. Ballintijn, C.M., P.G.M. Luiten and P.J.W. Jüch. 1979. Respiratory neuron activity in the mesencephalon, diencephalon and cerebellum of the carp. *J. Comp. Physiol.* **133**:131-39.  
{Keys: Brain/ Carp/ EEG/ Electromyogram (EMG)/ Histology/ Horse radish peroxidase (HRP)/ Morphology/ Nervous system/ Ventilation}
32. Ballintijn, C.M. 1983. A neurophysiological analysis of the nervous control of an action pattern: Respiration in fishes. *Neth. J. Zool.* **33**(3):343.  
{Keys: Brain/ Nervous system/ Ventilation}
33. Ballintijn, C.M., B.L. Roberts and P.G.M. Luiten. 1983. Respiratory responses to stimulation of branchial vagus nerve ganglia of a teleost fish. *Respir. Physiol.* **51**(2):241-257.  
{Keys: Brain/ Carp/ Cough/ *Cyprinus sp.*/ EEG/ Electromyogram (EMG)/ Histology/ Horse radish peroxidase (HRP)/ Morphology/ Nervous system/ Ventilation}
34. Ballintijn, C.M. and P.J.W. Jüch. 1984. Interaction of respiration with coughing, feeding, vision and oculomotor control in fish. *Brain Behav. Evol.* **25**(2-3):99-108.  
{Keys: Brain/ Cough/ Electromyogram (EMG)/ Feed/ Morphology/ Nervous system/ Pressure/ Ventilation}
35. Ballintijn, C.M. 1985. Neural representation of a behavioral pattern: Fish respiration. *Neth. J. Zool.* **35**(1-2):186-208.  
{Keys: Anesthetic/ Brain/ Carp/ Cough/ Electromyogram (EMG)/ MS<sub>222</sub>/ Nervous system/ Ventilation}
36. Bamford, O.S. 1974. Oxygen reception in the rainbow trout (*Salmo gairdneri*). *Comp. Biochem. Physiol.* **48A**:69-76.  
{Keys: Blood/ Heart/ Hypoxia/ O<sub>2</sub>/ Pressure/ Ventilation}

37. Bamford, O.S. 1974. Respiratory neurones in rainbow trout (*Salmo gairdneri*). *Comp. Biochem. Physiol.* **48A**:77-83.  
{Keys: Brain/ EEG/ Electromyogram (EMG)/ Heart/ Hypoxia/ Morphology/ Nervous system/ O<sub>2</sub>/ Ventilation}
38. Bansal, S.K., S.R. Verma, A.K. Gupta, S. Rani and R.C. Dalela. 1979. Pesticide-induced alterations in the oxygen uptake rate of a freshwater major carp (*Labeo rohita*). *Ecotoxicol. Environ. Saf.* **3**(4):374-382.  
{Keys: AChE/ Carbamate/ Carbaryl (Sevin)/ Chlordane/ Cyclodiene/ Metasystox/ Organophosphorus/ Pesticides/ Respirometry/ Ventilation/ VO<sub>2</sub>}
39. Barham, E.G., W.B. Huckabay, R. Gowdy and B. Burns. 1969. Microvolt electric signals from fishes and the environment. *Science*. **164**:965-968.  
{Keys: External electrodes/ Ventilation}
40. Barnett, J. and D.P. Toews. 1978. The effects of crude oil and the dispersant, Oilsperser 43, on respiration and coughing rates in Atlantic salmon (*Salmo salar*). *Can. J. Zool.* **56**:307-310.  
{Keys: Cough/ Oil/ Pressure/ Ventilation}
41. Barrett, D.J. and E.W. Taylor. 1985. Spontaneous efferent activity in branches of the vagus nerve controlling heart rate and ventilation in the dogfish. *J. Exp. Biol.* **117**:433-448.  
{Keys: Nervous system/ *Scyliorhinus sp.*/ Ventilation}
42. Barrow, C.S. 1982. Sensory irritation of inhaled aldehydes: Structure activity studies. *CIIT Activities*. **2**(9):3-5.  
{Keys: Irritant/ Mammal/ Mice/ Ventilation}
43. Barrow, M.J. and R.M.G. Wells. 1982. Ventilation and oxygen extraction in an arenicolid polychaete. *Comp. Biochem. Physiol.* **73A**(3):491-495.  
{Keys: *Abarenicola sp.*/ CO<sub>2</sub>/ Invertebrate/ Lugworm/ O<sub>2</sub>/ pH/ PO<sub>2</sub>/ Seawater/ Temperature/ Thermistor/ Ventilation/ VO<sub>2</sub>}
44. Bashamohideen, M., K. Obilesu and P.M. Reddy. 1987. Behavioral changes induced by malathion and methyl parathion in the freshwater fish (*Tilapia mossambica*). *Environ. Ecol.* **5**(2):403-404.  
{Keys: Organophosphorus/ Pesticides/ Ventilation}
45. Bass, M.L. 1975. *A study of lethality and toxic mechanisms of intermittent chlorination to freshwater fish*. Ph.D. Thesis. Virginia Polytechnic Institute and State University, Blacksburg (VA). 70 pp.  
{Keys: Blood/ Bluegill/ Chlorine (Cl)/ Cough/ Gill damage/ Heart/ Histology/ *Lepomis sp.*/ Mode of action/ Pressure/ *Salmo sp.* / Temperature/ Trout/ Ventilation}

46. Bass, M.L., C.R. Berry Jr. and A.G. Heath. 1977. Histopathological effects of intermittent chlorine exposure on bluegill (*Lepomis macrochirus*) and rainbow trout (*Salmo gairdneri*). *Water Res.* **11**(8):731-735.  
 {Keys: Chlorine (Cl)/ Cough/ Gill damage/ Histology/ Pressure/ Ventilation}
47. Bass, M.L. and A.G. Heath. 1977. Cardiovascular and respiratory changes in rainbow trout, (*Salmo gairdneri*) exposed intermittently to chlorine. *Water Res.* **11**(6):497-502.  
 {Keys: Blood/ Chlorine (Cl)/ Cough/ Gill damage/ Heart/ Mode of action/ PaO<sub>2</sub>/ Pressure/ Ventilation}
48. Bass, M.L. and A.G. Heath. 1977. Toxicity of intermittent chlorination to bluegill (*Lepomis macrochirus*): Interaction with temperature. *Bull. Environ. Contam. Toxicol.* **17**(4):416-423.  
 {Keys: Chlorine (Cl)/ Cough/ Temperature/ Visual}
49. Batterton, C.V. and J.N. Cameron. 1978. Characteristics of resting ventilation and response to hypoxia, hypercapnia, and emersion in the blue crab (*Callinectes sapidus* Rathbun). *J. Exp. Zool.* **203**(3):403-418.  
 {Keys: Invertebrate/ PCO<sub>2</sub>/ Ventilation volume (VG)/ VO<sub>2</sub>}
50. Baudin, L. 1932. Action de la tricaine sur le sang des poissons. Comptes rendus des Séances de la Societe de biologie. **115**:510-512. In: Schoettger, R.A. 1967. Annotated bibliography on MS<sub>222</sub> *Investigations in Fish Control: 16. Resource Publication 22*. Bureau of Sport Fisheries and Wildlife, Washington (DC). 15 pp.  
 {Keys: Anesthetic/ Blood/ Goldfish/ MS<sub>222</sub>/ Perch/ Ventilation}
51. Beitinger, T.L. and R.W. McCauley. 1990. Whole-animal physiological processes for the assessment of stress in fishes. *J. Gt. Lakes Res.* **16**(4):542-575.  
 {Keys: Cough/ Effluent/ Fish acute toxicity syndrome (FATS)/ Growth/ Metal/ O<sub>2</sub>/ Organic/ Review/ Salinity/ Swimming/ Temperature/ Ventilation}
52. Belaud, A., P. Sebert, P. Soulier and C. Peyraud. 1977. Relative estimation of ventilatory flow rate in the eel (*Anguilla anguilla* L.). *Rev. Can. Biol.* **36**(2):93-103.  
 {Keys: Attached electrodes/ Eel/ O<sub>2</sub>/ Pressure/ Temperature/ Ventilation volume (VG)}
53. Belaud, A. 1978. Influence of temperature on the breathing parameters of eels (*Anguilla anguilla* L.). [*Influence du facteur thermique sur les grandeurs cardio-ventilatoires de l'anguille (Anguilla anguilla L) Essai d'interpretation*]. *Cah. Lab. Hydrobiol. Montreau.* **6**:5-14. [French]. Aquat. Sci. Fish. Abstr. **9**:9311-1Q9.  
 {Keys: Eel/ Heart/ Temperature/ Ventilation/ VO<sub>2</sub>}

54. Belaud, A., Y. Trotter and C. Peyraud. 1979. Continuous evaluation of PaO<sub>2</sub> in fish: Recording and data processing. *J. Exp. Biol.* **82**:321-330.  
{Keys: Anesthetic/ *Anguilla sp.*/ Attached electrodes/ Blood/ Eel/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Urethane/ Ventilation}
55. Belding, D.L. 1929. The respiratory movements of fish as an indicator of a toxic environment. *Trans. Am. Fish. Soc.* **59**:238-46.  
{Keys: *Carassius sp.*/ Carp/ *Catostomus sp.*/ *Cyprinus sp.*/ Goldfish/ H<sub>2</sub>S/ O<sub>2</sub>/ *Salmo sp.*/ Sucker/ Temperature/ Trout/ Ventilation/ Visual}
56. Bengeri, K.V., K.M. Shivaraj and H.S. Patil. 1984. Toxicity of dimethyl-parathion to freshwater fish( *Labeo rohita*) and oxygen uptake rate of exposed fish. *Environ. Ecol.* **2**(1):1-4.  
{Keys: AChE/ Organophosphorus/ Parathion/ Pesticides/ Ventilation/ VO<sub>2</sub>}
57. Berschick, P., C.R. Bridges and M.K. Grieshaber. 1987. The influence of hyperoxia, hypoxia and temperature on the respiratory physiology of the intertidal rockpool fish (*Gobius cobitis* Pallas). *J. Exp. Biol.* **130**:369-387.  
{Keys: Attached electrodes/ Heart/ Impedance technology/ O<sub>2</sub>/ Respirometry/ Temperature/ Ventilation/ VO<sub>2</sub>}
58. Bert, P. 1870. Lecons sur la physiologie comparee de la respiration. *J.-B. Balliere et Fils, Paris.*  
{Keys: Ventilation}
59. Bevan, D.J. and D.L. Kramer. 1986. The effect of swimming depth on respiratory behaviour of the honey gourami (*Colisa chuna* Pisces, Belontiidae). *Can. J. Zool.* **64**(9):1893-1896.  
{Keys: Air breathing/ Ventilation}
60. Bevan, D.J. and D.L. Kramer. 1987. The respiratory behaviour of an air-breathing catfish, (*Clarias macrocephalus* Clariidae). *Can. J. Zool.* **65**(2):348-353.  
{Keys: Air breathing/ Hypoxia/ O<sub>2</sub>/ Ventilation frequency (fv)}
61. Bian, X.Y., J.M. He and L.H. Gong. 1985. An equipment for determining respiratory and cough frequencies of fish and its test. *Trans. Chin. Ichthyol. Soc.* **4**:109-116.  
{Keys: Cough/ Ventilation}
62. Bijtel, J.H. 1947. The mechanism of movement of the gill filaments in *Teleostei*. *Experientia.* **3**(4):158-160.  
{Keys: Cough/ Morphology/ *Tinca sp.*/ Ventilation}

63. Bijtel, J.H. 1949. The structure and the mechanism of movement of the gill filaments in *Teleosteis*. *Arch. Neerl. Zool.* **8**(3):267-288.  
{Keys: *Ameiurus sp./ Cobitis sp./ Cough/ Cyprinus sp./ Esox sp./ Gasterosteus sp./ Leuciscus sp./ Morphology/ Perca sp./ Phoxinus sp./ Rhodeus sp./ Salmo sp./ Tinca sp./ Umbra sp./ Ventilation*}
64. Bill, R.G. and F.P. Thurberg. 1985. Coughing: A new description of ventilatory reversals produced by the lobster (*Homarus americanus*). *Comp. Biochem. Physiol.* **80A**(3):333-336.  
{Keys: Attached electrodes/ Copper (Cu)/ Cough/ Effluent/ Impedance technology/ Invertebrate/ pH/ Pressure/ Ventilation}
65. Bimber, D.L., R.W. Boenig and M.L. Sharma. 1976. Respiratory stress in yellow perch induced by subtoxic concentrations of diquat. *Ohio J. Sci.* **76**(2):87-90.  
{Keys: Cough/ Herbicide/ *Perca sp./ Pesticides/ Pressure/ Ventilation*}
66. Biro, P. and G.M. Hughes. 1985. Recovery of cardiac and ventilatory frequencies after sub-acute pesticide (Abol-X) treatment in rainbow trout (*Salmo gairdneri* Richardson). *Acta. Biol. Hung.* **36**(3-4):269-279.  
{Keys: Cough/ Heart/ Pressure/ Ventilation}
67. Bishop, W.E. and A.W. McIntosh. 1981. Acute lethality and effects of sublethal cadmium exposure on ventilation frequency and cough rate of bluegill (*Lepomis macrochirus*). *Arch. Environ. Contam. Toxicol.* **10**:519-530.  
{Keys: External electrodes/ Metal/ Ventilation}
68. Black, E.C. 1951. Respiration in fishes. *Univ. Toronto Biol. Ser. 59. Publ. Ontario Fish. Res. Lab.* **71**:91-150.  
{Keys: Ventilation}
69. Black, M.C. and J.F. McCarthy. 1990. Effects of sublethal exposure to chlorine on the uptake of polychlorinated biphenyl congeners by rainbow trout (*Salmo gairdneri* Richardson). *Aquat. Toxicol.* **17**(3):275-290.  
{Keys: Gill damage/ Histopathology/ Irritant/ PCB/ Uptake efficiency (UE)/Ventilation}
70. Blasiola, G.C. 1976. Quinaldine sulphate, a new anaesthetic formulation for tropical marine fishes. *J. Fish Biol.* **10**:113-120.  
{Keys: Anesthetic/ Quinaldine/ Ventilation/ Visual}
71. Boal, J.G. and J.N. Ni. 1996. Ventilation rate of cuttlefish (*Sepia officinalis*) in response to visual stimuli. *Veliger.* **39**(4):342-347.  
{Keys: Octopus/ Predator/ Ventilation frequency (fv)}

72. Boddington, M.J., B.A. MacKenzie and A.S.W. DeFreitas. 1979. A Respirometer to measure the uptake efficiency of waterborne contaminants in fish. *Ecotoxicol. Environ. Saf.* **3**:383-393.  
{Keys: Metabolism/ Metal/ Methyl mercury/ Respirometry/ *Salmo sp.*/ Trout/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
73. Bond, C.E. 1996. *Biology of Fishes, Second Edition*. Saunders College Publishing, Harcourt Brace College Publishers, New York. 750 pp.  
{Keys: Cough/ Heart/ Respiration/ Ventilation}
74. Booth, P.M. Jr., C.M. Sellers Jr. and N.E. Garrison. 1981. Effects of intermittent chlorination on plasma proteins of rainbow trout (*Salmo gairdneri*). *Bull. Environ. Contam. Toxicol.* **26**(2):163-170.  
{Keys: Blood/ Chlorine (Cl)/ Cough/ Mode of action/ Ventilation}
75. Boutilier, R.G., P. Aughton and G. Shelton. 1984. O<sub>2</sub> and CO<sub>2</sub> transport in relation to ventilation in the Atlantic mackerel (*Scomber scombrus*). *Can. J. Zool.* **62**(4):546-554.  
{Keys: Blood/ Buccal/ Pressure/ Swimming/ Ventilation}
76. Bradbury, S.P., J.R. Coats and J.M. McKim. 1986. Toxicokinetics of fenvalerate in rainbow trout (*Salmo gairdneri*). *Environ. Toxicol. Chem.* **5**:567-576.  
{Keys: Blood/ External electrodes/ Histology/ Metabolism/ Mode of action/ Neurotoxicity/ Pesticides/ Pyrethroid/ Respirometry/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
77. Bradbury, S.P., J.M. McKim and J.R. Coats. 1987. Physiological response of rainbow trout, (*Salmo gairdneri*) to acute fenvalerate intoxication. *Pestic. Biochem. Physiol.* **27**(3):275-288.  
{Keys: Blood/ Cough/ External electrodes/ Gill damage/ Heart/ Histology/ Mode of action/ Neurotoxicity/ Pesticides/ Pyrethroid/ Respirometry/ Uptake efficiency (UE)/ Urine/ Ventilation volume (VG)/ VO<sub>2</sub>}
78. Bradbury, S.P. 1988. Fish acute toxicity syndromes: Application to the development of mechanism-specific QSARs. In: *QSAR 88. Proceedings of the Third International Workshop on Quantitative Structure-Activity Relationships in Environmental Toxicology. CONF-880520--(DE88013180)* (J.E. Turner, M.W. Williams, T.W. Schultz and N.J. Kwaak, eds.), pp. 61-70. National Technical Information Service, Springfield (VA).  
{Keys: AChE/ Anesthetic/ Blood/ Cough/ Cyclodiene/ External electrodes/ Heart/ Irritant/ Mode of action/ Pyrethroid/ Respirometry/ *Salmo sp.*/ Trout/ Uncoupler/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}

79. Bradbury, S.P., T.R. Henry, G.J. Niemi, R.W. Carlson and V.M. Snarski. 1989. Use of respiratory-cardiovascular responses of rainbow trout, (*Salmo gairdneri*) in identifying acute toxicity syndromes in fish: Part 3. Polar narcotics. *Environ. Toxicol. Chem.* **8**(3):247-261.  
{Keys: Aniline/ Cough/ Mode of action/ Phenol/ Ventilation/ VO<sub>2</sub>}
80. Bradbury, S.P., T.R. Henry and R.W. Carlson. 1990. Fish acute toxicity syndromes in the development of mechanism-specific QSARs. In: *Practical Applications of Quantitative Structure-Activity Relationships (QSAR) in Environmental Chemistry and Toxicology* (W. Karcher and J. Devillers, eds.), pp. 295-315. ECSC, EEC, EAEC, Brussels and Luxembourg.  
{Keys: Mode of action/ Ventilation}
81. Bradbury, S.P., R.W. Carlson, G.J. Niemi and T.R. Henry. 1991. Use of respiratory-cardiovascular responses of rainbow trout (*Oncorhynchus mykiss*) in identifying acute toxicity syndromes in fish: Part 4. Central nervous system seizure agents. *Environ. Toxicol. Chem.* **10**:115-131.  
{Keys: AChE/ Blood/ Chlorpyifos/ Convulsant/ Cough/ Cyclodiene/ Cypermethrin/ Endosulfan/ Endrin/ External electrodes/ Fenvalerate/ Mode of action/ Neurotoxicity/ Organochlorine/ Organophosphorus/ Pesticides/ Pyrethroid/ Respirometry/ Strychnine/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
82. Brainerd, E.L., J.S. Ditelberg and D.M. Bramble. 1993. Lung ventilation in salamanders and the evolution of vertebrate air-breathing mechanisms. *Biol. J. Linn. Soc.* **49**(2):163-183.  
{Keys: Air breathing/ Electromyogram (EMG)/ O<sub>2</sub>/ Ventilation}
83. Bridges, C.R. 1988. Respiratory adaptations in intertidal fish. *Am. Zool.* **28**(1):79-96.  
{Keys: Blood/ Heart/ Heart frequency (fh)/ Hypoxia/ Temperature/ Ventilation}
84. Brocksen, R.W. and H.T. Bailey. 1973. Respiratory response of juvenile chinook salmon and striped bass exposed to benzene, a water-soluble component of crude oil. *Proceedings of Joint Conference on Prevention and Control of Oil, Mar. 13-15, 1973.* pp. 783-791. American Petroleum Institute, USEPA and U.S. Coast Guard, Washington (D.C.).  
{Keys: Ventilation}
85. Brown, C.E. and B.S. Muir. 1970. Analysis of ram ventilation of fish gills with application to skipjack tuna (*Katsuwonus pelamis*). *J. Fish Res. Board Can.* **27**:1637-1652.  
{Keys: Swimming/ Ventilation volume (VG)/ VO<sub>2</sub>}

86. Brown, V.M. 1976. Advances in testing the toxicity of substances to fish. *Chem. Ind.* **4**:143-149.  
{Keys: Ventilation}
87. Bruecker, P. and M. Graham. 1993. The effects of the anesthetic ketamine hydrochloride on oxygen consumption rates and behaviour in the fish *Heros citrinellum* (Cichlasoma, Guenther, 1864). *Comp. Biochem. Physiol.* **104C**(1):57-59.  
{Keys: Anesthetic/ Ventilation/ VO<sub>2</sub>}
88. Bubien, J.K. 1982. *A hypothesis for the toxic mechanism of ammonia to fish*. Ph.D. Thesis. University of Rhode Island, Kingston. 138 pp.  
{Keys: Ammonia/ Attached electrodes/ Heart/ Mode of action/ *Salmo* sp./ *Salvelinus* sp./ Trout/ Ventilation}
89. Bull, C.J. and J.E. McInerney. 1974. Behavior of juvenile coho salmon (*Oncorhynchus kisutch*) exposed to sumithion (fenitrothion), an organophosphorusphosphate insecticide. *J. Fish Res. Board Can.* **31**(12):1867-1872.  
{Keys: AChE/ Activity/ Behavior/ Cough/ Feed/ Organophosphorus/ Pesticides/ Ventilation/ Visual}
90. Burggren, W.W. 1978. Gill ventilation in the sturgeon (*Acipenser transmontanus*): Unusual adaptations for bottom dwelling. *Respir. Physiol.* **34**:153-170.  
{Keys: Attached electrodes/ Blood/ Buccal/ Heart/ Impedance technology/ Morphology/ PaO<sub>2</sub>/ Pressure/ Respirometry/ Swimming/ Uptake efficiency (UE)/ Ventilation volume (VG)/ Video/ VO<sub>2</sub>}
91. Burggren, W.W. and D.J. Randall. 1978. Oxygen uptake and transport during hypoxic exposure in the sturgeon (*Acipenser transmontanus*). *Respir. Physiol.* **34**:171-183.  
{Keys: Attached electrodes/ Blood/ Heart/ Hypoxia/ Impedance technology/ Metabolism/ O<sub>2</sub>/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Respirometry/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
92. Burggren, W.W. and J.N. Cameron. 1980. Anaerobic metabolism, gas exchange, and acid-base balance during hypoxic exposure in the channel catfish (*Ictalurus punctatus*). *J. Exp. Zool.* **231**(3):405-416.  
{Keys: Blood/ Hypoxia/ O<sub>2</sub>/ PO<sub>2</sub>/ Respirometry/ Uptake efficiency (UE)/ Ventilation volume (VG)/ Visual/ VO<sub>2</sub>}
93. Burggren, W.W. 1982. Air gulping improves blood oxygen transport during aquatic hypoxia in the goldfish (*Carassius auratus*). *Physiol. Zool.* **55**(4):327-334.  
{Keys: Blood/ Hypoxia/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Ventilation}

94. Burggren, W.W. and B.R. McMahon. 1983. An analysis of scaphognathite pumping performance in the crayfish (*Orconectes virilis*): Compensatory changes to acute and chronic hypoxic exposure. *Physiol. Zool.* **56**(3):309-318.  
{Keys: Hypoxia/ Invertebrate/ Pressure/ Ventilation volume (VG)/ VO<sub>2</sub>}
95. Burleson, M.L. and W.K. Milsom. 1990. Propranolol inhibits O<sub>2</sub>-sensitive chemoreceptor activity in trout gills. *Am. J. Physiol.* **258**(4):R1089-1091.  
{Keys: Chemosensitive/ Gill/ Nervous system/ *Oncorhynchus sp.*/ Ventilation}
96. Burleson, M.L. and N.J. Smatresk. 1989. The effect of decerebration and anesthesia on the reflex responses to hypoxia in catfish. *Can. J. Zool.* **67**(3):630-635.  
{Keys: Anesthetic/ Cardiovascular system/ Heart/ *Ictalurus sp.*/ O<sub>2</sub>/ Ventilation}
97. Burton, D.T. 1979. Ventilation frequency compensation responses of three eurythermal estuarine fish exposed to moderate temperature increases. *J. Fish Biol.* **15**:589-600.  
{Keys: Attached electrodes/ *Leiostomus sp.*/ *Morone sp.*/ Perch/ Pressure/ Spot/ Temperature/ *Trinectes sp.*/ Ventilation}
98. Butler, P.J. and E.W. Taylor. 1971. Response of the dogfish, (*Scyliorhinus canicula*) to slowly induced and rapidly induced hypoxia. *Comp. Biochem. Physiol.* **39A**:307-323.  
{Keys: Atropine/ Blood pressure/ Heart/ Hypoxia/ O<sub>2</sub>/ Pressure/ Seawater/ Ventilation}
99. Butler, P.J. and E.W. Taylor. 1975. The effect of progressive hypoxia on respiration in the dogfish (*Scyliorhinus canicula*) at different seasonal temperatures. *J. Exp. Biol.* **63**:117-130.  
{Keys: Blood pressure/ Heart/ O<sub>2</sub>/ Respirometry/ Seawater/ Temperature/ Ventilation VO<sub>2</sub>}
100. Butler, P.J., E.W. Taylor and S. Short. 1977. The effect of sectioning cranial nerves V, VII, IX, and X on the cardiac response of the dogfish (*Scyliorhinus canicula*) to environmental hypoxia. *J. Exp. Biol.* **69**:233-245.  
{Keys: Atropine/ Blood pressure/ Brain/ Heart/ Morphology/ Nervous system/ O<sub>2</sub>/ Pancuronium bromide/ Pressure/ Respirometry/ Seawater/ Ventilation}
101. Butler, P.J., E.W. Taylor and W. Davison. 1979. The effect of long term, moderate hypoxia on acid-base balance, plasma catecholamines and possible anaerobic end products in the unrestrained dogfish (*Scyliorhinus canicula*). *J. Comp. Physiol.* **132**:297-303.  
{Keys: Blood pressure/ Heart/ Hypoxia/ O<sub>2</sub>/ PO<sub>2</sub>/ Seawater/ Ventilation volume (VG)}

102. Butler, P.J. and J.D. Metcalfe. 1983. Control of respiration and circulation. In: *Control Processes in Fish Physiology* (J.C. Rankin, T.J. Pitcher and R.T. Duggan, eds.), pp. 41-65. John Wiley and Sons, New York.  
{Keys: Blood/ Brain/ CO<sub>2</sub>/ EEG/ Heart/ Hypoxia/ Morphology/ Nervous system/ O<sub>2</sub>/ Review/ Swimming/ Ventilation volume (VG)}
103. Byrne, J.H. and J. Koester. 1978. Respiratory pumping: Neuronal control of a centrally commanded behavior in aplysia. *Brain Res.* **143**:87-105.  
{Keys: Blood pressure/ Calcium (Ca)/ Heart/ Invertebrate/ Magnesium (Mg)/ Morphology/ Nervous system/ Ventilation}
104. Byrne, P.J., V.E. Ostland and J.S. Lumsden. 1995. Blood chemistry and acid-base balance in rainbow trout (*Oncorhynchus mykiss*) with experimentally-induced acute bacterial gill disease. *Fish Physiol. Biochem.* **14**(6):509-518.  
{Keys: Bacteria/ Blood/ Cough frequency (fc)/ Ventilation frequency (fv)}
105. Cairns, J.Jr. 1970. New concept for managing aquatic life systems. *J. Water Pollut. Contr. Fed.* **42**(1):77-82.  
{Keys: Ventilation}
106. Cairns, J.Jr., K.L. Dickson, R.E. Sparks and W.T. Waller. 1970. A preliminary report on rapid biological information systems for water pollution control. *J. Water Pollut. Contr. Fed.* **42**(5):685-703.  
{Keys: Heart/ Hypoxia/ Metal/ Ventilation/ Zinc (Zn)}
107. Cairns, J.Jr., R.E. Sparks and W.T. Waller. 1970. Biological systems as pollution monitors. *Res. Dev.* **9**:22-24.
108. Cairns, J.Jr. and R.E. Sparks. 1971. The use of bluegill breathing to detect zinc. *USEPA, Water Pollution Control Research Series, 18050 EDQ 12 71*. U.S. Government Printing Office, Washington (D.C.). 46 pp.  
{Keys: Ventilation}
109. Cairns, J.Jr. and W.T. Waller. 1971. The use of fish movement patterns to monitor zinc. *USEPA Water Pollution Control Research Series, 18050 EDP 12 71*. U.S. Government Printing Office, Washington (D.C.). 56 pp.  
{Keys: Locomotion/ Metal/ Turbidity}}

110. Cairns, J.Jr., J.W. Hall, E.L. Morgan, R.E. Sparks, W.T. Waller and G.F. Westlake. 1973. The development of an automated biological monitoring system for water quality. *VPI-WRRC-Bull. No. 59*. Virginia Polytechnic Institute and State University, Blacksburg (Virginia). 50 pp.  
{Keys: Bluegill/ Calcium (Ca)/ Chlorine (Cl)/ Copper (Cu)/ Metal/ Temperature/ Ventilation/ Zinc (Zn)}
111. Cairns, J.Jr., G.R. Lanza, R.E. Sparks and W.T. Waller. 1973. Developing biological information systems for water quality management. *Water Resour. Bull.* **9**:81-99.  
{Keys: Effluent/ Locomotion/ Ventilation}
112. Cairns, J.Jr., R.E. Sparks and W.T. Waller. 1973. A tentative proposal for a rapid in-plant biological monitoring system. In: *Biological Methods for the Assessment of Water Quality, ASTM STP 528* (J. Cairns Jr. and K.L. Dickson), pp. 127-147. American Society for Testing And Materials, Baltimore.  
{Keys: Copper (Cu)/ Metal/ Ventilation/ Zinc (Zn)}
113. Cairns, J.Jr., R.E. Sparks and W.T. Waller. 1973. The use of fish as sensors in industrial waste lines to prevent fish kills. *Hydrobiologia*. **41**(2):151-167.  
{Keys: Cough frequency (fc)/ Ventilation}
114. Cairns, J.Jr., R.E. Sparks and W.T. Waller. 1973. The relationship between continuous biological monitoring and water quality standards for chronic exposure. In: *Bioassay Techniques and Environmental Chemistry* (G.E. Glass, ed.), pp. 383-402. Ann Arbor Science Publishers, Inc., Ann Arbor (Michigan).  
{Keys: Chronic/ Metals/ Ventilation}
115. Cairns, J.Jr., J.W. Hall, E.L. Morgan, R.E. Sparks, W.T. Waller and G.F. Westlake. 1974. The development of an automated biological monitoring system for water quality management. In: *Trace Substances in Environmental Health - VII. 1974. A Symposium*. (D. D. Hemphill, ed.), pp. 35-40. University of Missouri, Columbia (Missouri).  
{Keys: Locomotion/ Metal/ Ventilation/ Zinc (Zn)}
116. Cairns, J.Jr., E.L. Morgan and R.E. Sparks. 1974. The response of bluegills (*Lepomis macrochirus* R) in a pollution monitoring system to a diurnal temperature change. *Trans. Am. Fish. Soc.* **103**:138-140.  
{Keys: Locomotion/ Ventilation}
117. Cairns, J.Jr., R.E. Sparks and W.T. Waller. 1974. The design of continuous flow biological early warning system for industrial use. *Eng. Bull. Purdue Univ. Eng. Ext. Ser.* **141**(1):242-255.  
{Keys: Ventilation}

118. Cairns, J.Jr. 1975. Quality control systems. In: *River Ecology* (B.A. Whitten, ed.), pp. 588-612. Blackwell's Scientific Publications Ltd., London.  
{Keys: Monitoring/ Ventilation}
119. Cairns, J.Jr., K.L. Dickson and G.F. Westlake. 1975. Continuous biological monitoring to establish parameters for water pollution control. *Prog. Water Technol.* 7:829-841.  
{Keys: Effluent/ Ventilation}
120. Cairns, J.Jr. and K.L. Dickson, eds. 1976. Biological Methods For The Assessment of Water Quality, ASTM STP 528. American Society for Testing And Materials, Baltimore. 256 pp.
121. Cairns, J.Jr., W.F. Calhoun, M.J. McGinniss and W. Straka. 1976. Aquatic organisms response to severe stress following acutely sublethal toxicant exposure. *Water Resour. Bull.* 12(6):1233-1243.  
{Keys: Ventilation}
122. Cairns, J.Jr., K.L. Dickson and G.F. Westlake, eds. 1976. Biological Monitoring of Water and Effluent Quality, STP 607. *American Society for Testing and Materials*, Philadelphia (PA). 246 pp.  
{Keys: Effluent/ Ventilation}
123. Cairns, J.Jr., D. Gruber, K.L. Dickson, A.C. Hendricks and W.H. van der Schalie. 1977. Developing an on-site continuous biological monitoring system for the chemical industry. In: *Proceedings of the Fifth Annual Industrial Pollution Conference* (L. Delpino and A. Krigman, eds), pp. 285-294. Water and Wastewater Equipment Manufacturers Association, Inc., McLean (VA).  
{Keys: Ventilation}
124. Cairns, J.Jr. and K.L. Dickson. 1978. Field and laboratory protocols for evaluating the effects of chemical substances on aquatic life. *J. Test Eval.* 6(2):81-90.  
{Keys: Ventilation}
125. Cairns, J.Jr., K.L. Dickson and A.W. Maki, eds. 1978. Estimating the hazard of chemical substances to aquatic life, STP 657. *American Society for Testing and Materials*, Philadelphia (PA). 278 pp.  
{Keys: Review}
126. Cairns, J.Jr. and D. Gruber. 1979. Coupling mini-and microcomputers to biological early warning systems. *Bioscience*. 29(11):665-669.  
{Keys: Ventilation}
127. Cairns, J.Jr. 1980. Computer interfaced systems for biological monitoring of water quality. In: *Proceedings of the 2nd Interagency Workshop on In-situ Water Quality Sensing; Biological Sensors*. 28-30 April 1980, Pensacola (FL) (E.D. Kennedy, ed.), pp. 81-101. NOAA/ National Marine Pollution Program Office, Rockville (MD).  
{Keys: Ventilation}

128. Cairns, J.Jr. 1980. Environmental analysis. In: *Fisheries Management* (R.T. Lackey and L.A. Nielson, eds.), pp. 219-244. John Wiley and Sons, Inc., New York.  
{Keys: Ventilation}
129. Cairns, J.Jr. and K.L. Dickson. 1980. The ABC's of biological monitoring. In: *Biological Monitoring of Fish* (C.H. Hocutt and J.R. Stauffer, eds), pp. 1-31. Lexington Books, D.C. Heath and Company, Lexington (Mass).  
{Keys: Ventilation}
130. Cairns, J.Jr. and D. Gruber. 1980. A comparison of methods and instrumentation of biological early warning systems. *Water Resour. Bull.* **16**(2):261-266.  
{Keys: Ventilation}
131. Cairns, J.Jr. and D. Gruber. 1980. Use of fish with implant monitoring. In: *Biological Monitoring of Fish*. (C.H. Hocutt and J.R. Stauffer, eds.), pp. 43-58. Lexington Books, D.C. Heath and Company, Lexington (Mass).  
{Keys: Ventilation}
132. Cairns, J.Jr., A.C. Hendricks and K. W. Thompson. 1980. Ventilatory responses of fish to fluctuating applications of toxicants. Tenth Progress Report of the Project Entitled: *Center for Environmental Studies, Virginia Polytechnic Institute and State University, Blacksburg (VA)*. 4 pp.  
{Keys: Ventilation}
133. Cairns, J.Jr. and K. W. Thompson. 1980. A computer interfaced toxicity testing system for simulating variable effluent loading. In: *Second Symposium on Process Measurements for Environmental Assessment* (P.L. Levins, J.C. Harris and K.D. Drewitz, eds.), pp. 185-198. Arthur D. Little Inc, Cambridge (Mass).  
{Keys: Ventilation}
134. Cairns, J.Jr., K.W. Thompson, J.D. Landers, M.J. McKee and A.C Hendricks. 1980. Suitability of some fresh water and marine fishes for use with a minicomputer interfaced monitoring system. *Water Res. Bull.* **16**(3):421-427.  
{Keys: Ventilation}
135. Cairns, J.Jr. and W.H. van der Schalie. 1980. Biological monitoring. Part 1 -- Early warning systems. *Water Res.* **14**:1179-1196.  
{Keys: Ventilation}

136. Cairns, J.Jr. 1981. Biological monitoring. Part VI -- Future needs. *Water Res.* **15**:941-952
137. Cairns, J.Jr. 1981. The use of minicomputers in biology. *Biologist*. **63**(2):33-47.  
{Keys: Ventilation}
138. Cairns, J.Jr., K.W. Thompson and A.C. Hendricks. 1981. Effects of fluctuating, sublethal applications of heavy metal solutions upon the gill ventilation response of bluegills (*Lepomis macrochirus*). USEPA, EPA-600 3-81-003. National Technical Information Service, Springfield (VA). 90 pp.  
{Keys: Ventilation}
139. Cairns, J.Jr., K.W. Thompson and A.C. Hendricks. 1981. Project Summary: Effects of fluctuating, sublethal applications of heavy metal solutions upon the gill ventilation response of bluegills (*Lepomis macrochirus*). USEPA, EPA-600 S3-81-003. National Technical Information Service, Springfield (VA). 4pp.  
{Keys: Ventilation}
140. Cairns, J.Jr. 1982. *Biological Monitoring in Water Pollution*. Pergamon Press, New York.
141. Cairns, J.Jr. and K.W. Thompson. 1984. Computer interfaced toxicity testing system for simulating variable effluent loading. USEPA .EPA-600 D-84-063. National Technical Information Center, Springfield (VA). 15 pp.  
{Keys: Effluent/ Ventilation}
142. Cairns, J.Jr. 1988. Validating biological monitoring. In: *Automated Biomonitoring: Living Sensors as Environmental Monitors, Chapter 3* (D. Gruber and J. Diamond, eds.), pp. 40-48. Ellis Horwood Limited, Chichester (England).
143. Cairns, M.A. and R.R. Garton. 1982. Use of fish ventilation frequency to estimate chronically safe toxicant concentrations. *Trans. Am. Fish. Soc.* **111**: 70-77.  
{Keys: CaCO<sub>3</sub>/ External electrodes/ Hardness/ Metal/ *Salmo sp.*/ Temperature/ Trout/ Ventilation/ Zinc (Zn)}
144. Camougis, G. 1960. Recording bioelectrical potentials from aquatic animals. *Turtox News*. **38**(6):156-157.  
{Keys: External electrodes/ Frog/ Heart/ Invertebrate/ Ventilation}
145. Camougis, G. 1970. Nerves, Muscles and Electricity. *An Introductory Manual of Electrophysiology*. Appleton-Century-Crofts, New York. 81 pp.  
{Keys: Electromyogram (EMG)/ External electrodes/ Frog/ Heart/ Invertebrate/ Ventilation}

146. Campagna, C.G. and J.J. Cech Jr. 1981. Gill ventilation and respiratory efficiency of Sacramento blackfish (*Orthodon microlepidotus* Ayres) in hypoxic environments. *J. Fish Biol.* **19**:581-591.  
{Keys: External electrodes/ Hypoxia/ O<sub>2</sub>/ PO<sub>2</sub>/ Respirometry/ Temperature/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
147. Campbell, G.D. and D.H. Davies. 1963. Effect of ethyl-*m*-aminobenzoate (MS<sub>222</sub>) on the elasmobranch electrocardiograph. *Nature*. **198**:302.  
{Keys: Anesthetic/ Brain/ Heart/ MS<sub>222</sub>/ Nervous system/ Seawater/ Shark/ Ventilation}
148. Canton, J.H. and W. Slooff. 1982. Toxicity and accumulation studies of cadmium (Cd) with freshwater organisms of different trophic levels. *Ecotoxicol. Environ. Saf.* **6**(1):113-128.  
{Keys: Cadmium (Cd)/ Histology/ Metal/ *Salmo* sp./ Trout/ Ventilation}
149. Capra, M.F. 1975. Respiratory arrhythmias in the Port Jackson shark (*Heterodontus portusjacksoni*). *Comp. Biochem. Physiol.* **50A**:669-674.  
{Keys: Anesthetic/ Blood/ CO<sub>2</sub>/ Cough/ Nervous system/ O<sub>2</sub>/ Pressure/ Ventilation}
150. Capra, M.F. 1976. A technique for recording the respiratory movements of unrestrained elasmobranch fish. *J. Fish Biol.* **9**:1-2.  
{Keys: *Heterodontus* sp./ Shark/ Ventilation}
151. Carlson, R.W. and R.A. Drummond. 1978. Fish cough response--A method for evaluating quality of treated complex effluents. *Water Res.* **12**:1-6.  
{Keys: Bluegill/ Cough/ Effluent/ External electrodes/ *Lepomis* sp./ Ventilation}
152. Carlson, R.W. 1982. Some characteristics of ventilation and coughing in the bluegill (*Lepomis macrochirus* Rafinesque). *Environ. Pollut., Ser. A*. **29**:35-56.  
{Keys: Cough/ External electrodes/ Metal/ Mode of action/ Pressure/ Ventilation/ Zinc (Zn)}
153. Carlson, R.W. 1984. The influence of pH, dissolved oxygen, suspended solids or dissolved solids upon the ventilatory and cough frequencies in the bluegill (*Lepomis macrochirus*) and brook trout (*Salvelinus fontinalis*). *Environ. Pollut., Ser. A*. **34**:149-169.  
{Keys: CaCO<sub>3</sub>/ CO<sub>2</sub>/ Cough/ External electrodes/ O<sub>2</sub>/ pH/ Suspended solids/ Ventilation}

154. Carlson, R.W., G.J. Lien and B.A. Holman. 1989. An automated monitoring system for fish physiology and toxicology. *USEPA. EPA 600 3-89 011*. National Technical Information Service, Springfield (VA). 75 pp.  
 {Keys: Blood/ Cough/ External electrodes/ Heart/ Mode of action/ O<sub>2</sub>/ pH/ Respirometry/ Temperature/ Thermistor/ Trout/ Uptake efficiency (UE)/ Urine/ Ventilation volume (VG)/ VO<sub>2</sub>}
155. Carlson R.W. 1990. Ventilatory patterns of bluegill (*Lepomis macrochirus*) exposed to organic chemicals with different mechanisms of toxic action. *Comp. Biochem. Physiol.* **95C**(2):181-196.  
 {Keys: AChE/ Acrolein/ Aldehyde/ Anesthetic/ Carbamate/ Carbaryl (Sevin)/ Chloroethanol/ Chloroform/ Cough/ DMF/ DNP/ External electrodes/ Irritant/ Malathion/ Meparfynol/ Mode of action/ MS<sub>222</sub>/ Neurotoxicity/ Octanol/ Organophosphorus/ PCP/ Pentanedione/ Pesticides/ Phenoxyethanol/ Procaine/ Rotenone/ Sunfish/ Uncoupler/ Ventilation}
156. Carpenter, K.E. 1927. The lethal action of soluble metallic salts on fishes. *British J. Expt. Biol.* **4**:378-390.  
 {Keys: *Gasterosteus sp.*/ Gill damage/ Lead (Pb)/ Metal/ Mode of action/ Stickleback/ Ventilation/ Visual}
157. Cech, J.J.Jr., D.W. Bridges and D.B. Horton. 1975. Respiration of Marine Organisms. *Proceedings of the Marine Section, First Maine Biomedical Science Symposium, 14-15 Mar 1975, Augusta, Maine*. The Research Institute of the Gulf of Maine, South Portland (Maine). 198 pp.  
 {Keys: Blood/ Heart/ Hypoxia/ Invertebrate/ Swimming/ Temperature/ Uptake efficiency (UE)/ Ventilation}
158. Cech, J.J.Jr. and D.E. Wohlschlag. 1982. Seasonal patterns of respiration, gill ventilation, and hematological characteristics in the striped mullet (*Mugil cephalus*). *Bull. Mar. Sci.* **32**(1):130-138.  
 {Keys: Blood/ Mullet/ Respirometry/ Temperature/ Uptake efficiency (UE)/ Ventilation volume (VG)/ Visual/ VO<sub>2</sub>}
159. Cech, J.J.Jr. and M.J. Massingill. 1995. Tradeoffs between respiration and feeding in Sacramento blackfish (*Orthodon microlepidotus*). *Environ. Biol. Fishes.* **44**(1-3):157-163.  
 {Keys: Gill/ Hypoxia/ PO<sub>2</sub>/ Respirometry/ Ventilation frequency (fv)/ Ventilation volume (VG)}
160. Chalon, J., P. Martin, C. Roberts, S. Ramanathan, R. Katz and T. Turndorf. 1983. Anaesthetic uptake by the goldfish: Effect of respiratory rate. *Acta Anaesthesiol. Scand.* **27**(5):361-365.  
 {Keys: Anesthetic/ *Carassius sp.*/ CO<sub>2</sub>/ Halothane/ O<sub>2</sub>/ Temperature/Ventilation/ Visual}

161. Chardon, M. and E. de la Hoz. 1977. Anatomical and functional remarks concerning the suspensorium and the opercular series in *Sternopygus macrurus* (Bloch and Schneider) and *Eigenmannia virescens* (Val) (Teleostei Gymnotoidei). [Remarques anatomiques et fonctionnelles à propos du suspensorium et de la série operculaire chez *Sternopygus macrurus* (Bloch and Schneider) and *Eigenmannia virescens* (Val) (Teleostei Gymnotoidei)]. *Ann. Soc. R. Zool. Belg.* **106**(2-4):177-191. [French].  
 {Keys: Buccal/ Morphology/ Ventilation}
162. Cherkin, A. and J.F. Catchpool. 1964. Temperature dependence of anesthesia in goldfish. *Science*. **144**:1460-1462.  
 {Keys: Anesthetic/ *Carassius sp.*/ Chloroform/ Ether/ Halothane/ Methoxyflurane/ Temperature/ Ventilation/ Visual}
163. Chiszar, D., M. Moody and J.T. Windell. 1972. Failure of bluegill sunfish (*Lepomis macrochirus*) to habituate to handling. *J. Fish. Res. Board Can.* **29**:576-578.  
 {Keys: Ventilation/ Visual}  
 {Keys: Blood/ Gill damage/ Metal/ Mode of action/ Tin (Sn)/ Trout/ Ventilation/ Visual}
164. Chliamovitch, Y.P. and C. Kuhn. 1977. Behavioural, haematological and histological studies on acute toxicity of bis(tri-n-butyltin) oxide on *Salmo gairdneri* (Richardson) and *Tilapia rendalli* (Boulenger). *J. Fish Biol.* **10**(6):575-585.
165. Claridge, P.N. and I.C. Potter. 1975. Oxygen consumption, ventilatory frequency and heart rate of lamprey (*Lampetra fluviatilis*) during their spawning run. *J. Exp. Biol.* **63**:193-206.  
 {Keys: External electrodes/ Heart/ O<sub>2</sub>/ Respirometry/ Temperature/ Ventilation/ VO<sub>2</sub>}
166. Colmorgan, M. and R.J. Paul. 1995. Imaging of physiological functions in transparent animals (*Agonus cataphractus*, *Daphnia magna*, *Pholcus phalangioides*) by video microscopy and digital image processing. *Comp. Biochem. Physiol.* **111A**(4):583-595.  
 {Keys: Hypoxia/ Ventilation}
167. Crawshaw, L.I., H.T. Hammel and W.F. Garey. 1973. Brainstem temperature affects gill ventilation in the California scorpionfish. *Science*. **181**:579-582.  
 {Keys: Attached electrodes/ Brain/ Heart/ Nervous system/ *Scorpaena sp.*/ Scorpionfish/ Temperature/ Ventilation volume (VG)}

168. Crawshaw, L.I. 1976. Effect of rapid temperature change on mean body temperature and gill ventilation in carp. *Am. J. Physiol.* **231**(3):837-841.  
{Keys: Brain/ *Cyprinus sp.*/ Nervous system/ Respirometry/ Temperature/ Thermistor/ Ventilation volume (VG)}
169. Crawshaw, L.I. 1977. Physiological and behavioral reactions of fishes to temperature change. *J. Fish. Res. Board Can.* **34**:730-734.  
{Keys: Behavior/ Blood/ Brain/ Nervous system/ Temperature/ Ventilation volume (VG)}
170. Dandy, J.W.T. 1967. *The effects of chemical characteristics of the environment on the activity of an aquatic organism*. Ph.D. Thesis, University of Toronto(Ont). 125 pp.  
{Keys: Activity/ Chlorine (Cl)/ Copper (Cu)/ Cough/ Feed/ Gill damage/ Metal/ O<sub>2</sub>/ *Salvelinus sp.*/ Sulfide/ Thermistor/ Trout/ Ventilation}
171. Dandy, J.W.T. 1972. Activity response to chlorine in the brook trout (*Salvelinus fontinalis* Mitchell). *Can. J. Zool.* **50**:405-410.  
{Keys: Activity/ Cough/ Thermistor/ Ventilation/ Visual}
172. Davenport, J. and O. Vahl. 1979. Responses of the fish( *Blennius pholis*) to fluctuating salinities. *Mar. Ecol. (Progr. Ser.)*. **1**(2):101-107.  
{Keys: Attached electrodes / Blenny/ Blood/ Heart/ Impedance technology/ Respirometry/ Salt/ Ventilation/ VO<sub>2</sub>}
173. Davenport, J. and A.D. Woolmington. 1982. A new method of monitoring ventilatory activity in mussels and its use in a study of the ventilatory patterns of *Mytilis edulis*. *J. Exp. Mar. Biol. Ecol.* **62**(1):55-67.  
{Keys: External electrodes/ Feed/ Invertebrate/ Ventilation}
174. Davenport, J. 1993. Ventilation of the gills by the pectoral fins in the fangtooth (*Anoplogaster cornutum*): How to breathe with a full mouth. *J. Fish Biol.* **42**(6):967-970.  
{Keys: Ventilation}
175. Davies, P.E. 1987. Physiological, anatomic and behavioural changes in the respiratory system of *Salmo gairdneri* on acute and chronic exposure to chlorothalonil. *Comp. Biochem. Physiol.* **88C**(1):113-119.  
{Keys: Behavior/ Blood/ External electrodes/ Gill damage/ Morphology/ Trout/ Ventilation}

176. Davis, J.C. 1971. Circulatory and ventilatory response of rainbow trout (*Salmo gairdneri*) to artificial manipulation of gill surface area. *J. Fish. Res. Board Can.* **28**:1609-1614.  
{Keys: Blood/ Uptake efficiency (UE)/ Ventilation volume (VG)/ Visual/ VO<sub>2</sub>}
177. Davis, J.C. and J.N. Cameron. 1971. Water flow and gas exchange at the gills of rainbow trout (*Salmo gairdneri*). *J. Exp. Biol.* **54**(1):1-18.  
{Keys: Heart/ Hypoxia/ O<sub>2</sub>/ PaO<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation volume (VG)/ Visual/ VO<sub>2</sub>}
178. Davis, J.C. 1973. Sublethal effects of bleached kraft pulp mill effluent on respiration and circulation in the sockeye salmon (*Oncorhynchus nerka*). *J. Fish. Res. Board Can.* **30**(3):369-377.  
{Keys: BKME/ Blood/ Buccal/ Cough/ Effluent/ PaO<sub>2</sub>/ Pressure/ Respirometry/ *Salmo sp.*/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
179. Davis, J.C. and D.J. Randall. 1973. Gill irrigation and pressure relationships in rainbow trout (*Salmo gairdneri*). *J. Fish. Res. Board Can.* **30**:99-104.  
{Keys: Pressure/ Respirometry/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
180. Davis, J.C. 1976. Progress in sublethal effect studies with kraft pulp mill effluent and salmonids. *J. Fish. Res. Board Can.* **33**:2031-2035.  
{Keys: BKME/ Cough/ Effluent/ Metabolism/ Salmonid/ Temperature/ Trout/ Ventilation}
181. Davis, J.C., I.G. Shand and B.J. Mason. 1976. Biological and oceanographic studies at a kraft pulp and paper mill outfall at Crofton, B.C. 1974. *Technical Report No. 652*. Fisheries and Marine Service, Environment Canada. 67 pp.  
{Keys: Buccal/ Cough/ Effluent/ *Salmo sp.*/ Seawater/ Trout/ Ventilation}
182. Davis, R.E. 1981. A method of restraining goldfish during conditioning of electric-shock-induced suppression of breathing movements. *Behav. Res. Methods Instrum.* **13**(5):650-652.  
{Keys: *Carassius sp.*/ Thermistor/ Ventilation}
183. Daxboeck, C. and G.F. Holton. 1978. Oxygen receptors in the rainbow trout (*Salmo gairdneri*). *Can. J. Zool.* **56**:1254-1259.  
{Keys: Cough/ Heart/ Hypoxia/ O<sub>2</sub>/ Pressure/ Ventilation}
184. Daxboeck, C. and G.F. Holton. 1980. The effect of MS<sub>222</sub> on the hypoxic response of rainbow trout (*Salmo gairdneri*). *Comp. Biochem. Physiol.* **65C**:117-121.  
{Keys: Anesthetic/ Cough/ Heart/ Hypoxia/ MS<sub>222</sub>/ O<sub>2</sub>/ Pressure/ Ventilation}

185. Dejours, P., W.F. Garey and H. Rahn. 1970. Comparison of ventilatory and circulatory flow rates between animals in various physiological conditions. *Respir. Physiol.* **9**:108-117.  
{Keys: Blood/ Ventilation}
186. Dejours, P. 1973. Problems of control of breathing in fishes. In: *Comparative Physiology, Locomotion, Respiration, Transport and Blood*. (L. Bolis, K. Schmidt-Nielsen and S.H.P. Maddrell, eds.), pp. 117-133. North-Holland/ American Elsevier, Amsterdam.  
{Keys: Ventilation}
187. Dejours, P. 1975. *Principles of Comparative Respiratory Physiology*. North Holland Publishing Company, Amsterdam. 253 pp. (ERLD Lib QP121.D36).  
{Keys: Blood/ Review/ Ventilation volume (VG)/ VO<sub>2</sub>}
188. Dejours, P., A. Toulmond and J.P. Truchot. 1977. The effect of hyperoxia on the breathing of marine fishes. *Comp. Biochem. Physiol.* **58A**:409-411.  
{Keys: O<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation/ Visual}
189. DeLaney, R.G. and A.P. Fishman. 1977. Analysis of lung ventilation in the aestivating lungfish (*Protopterus aethiopicus*). *Am. J. Physiol.* **233**:R181-R187.
190. Depledge, M.H. 1984. Photoplethysmography - a non-invasive technique for monitoring heart beat and ventilation rate in decapod crustaceans. *Comp. Biochem. Physiol.* **77A**(2):369-371.  
{Keys: Crustacean/ Invertebrate/ Ventilation}
191. Dassy, R.E. 1976. Microprocessors? - An end user's view. *Science*. **192**(4239):511-518.  
{Keys: Cough/ Pressure/ Ventilation}
192. Diamond, J.M., M. Collins and D. Gruber. 1988. An overview of automated biomonitoring - Past developments and future needs. In: *Automated Biomonitoring: Living Sensors as Environmental Monitors, Chap. 2* (D. Gruber and J. Diamond, eds.), pp. 23-39. Ellis Horwood Limited, Chichester (England).  
{Keys: Ventilation}
193. Diamond, J.M., M.J. Parson and D. Gruber. 1990. Rapid detection of sublethal toxicity using fish ventilatory behavior. *Environ. Toxicol. Chem.* **9**(1):3-11.  
{Keys: Bluegill/ Cadmium (Cd)/ Cough frequency (fc)/ *Lepomis* sp./ Metal/ Ventilation frequency (fv)/ Zinc (Zn)}

194. Diamond, J.M. 1990. Fish respiration--Biomonitoring. In: *Methods in Behavioral Toxicology. 11th Annual Meeting. 11-15 Nov 1990. Arlington(VA)*. pp. 59-81. Society of Environmental Toxicology and Chemistry (SETAC).  
{Keys: Ventilation}
195. Dick, G.L. 1975. Some observations on the use of MS<sub>222</sub> Sandoz with grey mullet (*Mugil chelos* Cuvier). *J. Fish Biol.* 7:263-268.  
{Keys: Anesthetic/ Ventilation/ Visual}
196. Dickson, K.L., D. Gruber, C. King and K. Lubenski. 1980. Biological monitoring to provide an early warning of environmental contaminants In: *Biological Monitoring for Environmental Effects*. (D.L. Worf, ed.), pp. 53-74. Lexington Books, D.C. Heath Co., Lexington (Mass). 225 pp.  
{Keys: Bluegill/ Chlorine (Cl)/ External electrodes/ *Lepomis* sp./ Ventilation}
197. Dively, J.L., J.E. Mudge, W.H. Neff and A. Anthony. 1977. Blood PO<sub>2</sub>, PCO<sub>2</sub> and pH changes in brook trout (*Salvelinus fontinalis*) exposed to sublethal levels of acidity. *Comp. Biochem. Physiol.* 57A:347-351.  
{Keys: Behavior/ Blood/ H+/ PaO<sub>2</sub>/ PCO<sub>2</sub>/ pH/ Ventilation/ Visual}
198. Dixon, R.N. and P. Milton. 1978. The effects of an anaesthetic quinaldine on oxygen consumption in an intertidal teleost (*Blennius pholis* L.). *J. Fish Biol.* 12:359-369.  
{Keys: Anesthetic/ Blenny/ Respirometry/ Ventilation/ VO<sub>2</sub>}
199. Doane, T.R., J. Cairns Jr. and A.L. Buikema Jr. 1985. Comparison of biomonitoring techniques for evaluating effects of jet fuel on bluegill sunfish (*Lepomis macrochirus*). In: *Freshwater Biological Monitoring: Proceedings of a Specialized Conference Held in Cardiff, U.K.* (D. Pascoe and R.W. Edwards, eds.), pp. 103-112. Pergamon Press, New York. Presented at Freshwater Biological Monitoring Conference. Cardiff, Wales (UK). 12-14 Sept 1984.  
{Keys: Avoidance/ Behavior/ Jet fuel/ Ventilation volume (VG)}
200. Dolinin, V.A. 1972. The regulatory mechanism of the respiratory rhythm in fish. *J. Ichthyol.* 16(1):176-178.  
{Keys: *Esox* sp./ Ide/ *Leuciscus* sp./ Pike/ Ventilation volume (VG)/ Visual}
201. Domino, E.F., H. Krutakkrol and J. Lal. 1985. Evidence for a central site of action for the antitussive effects of caramiphen. *J. Pharmacol. Exp. Ther.* 233(1):249-253.  
{Keys: Cough}
202. Douglas, W.A. and W.J.R. Lanzing. 1981. The respiratory mechanisms of the dusky flathead (*Platycephalus fuscus* Platycephalidae, Scorpaeniformes). *J. Fish Biol.* 18(5):545-552.  
{Keys: Cough/ Morphology/ Suspended solids/ Ventilation/ Video}

203. Drewes, C.D. and M.J. Zoran. 1989. Neurobehavioral specializations for respiratory movements and rapid escape from predators in posterior segments of the tubificid (*Branchiura sowerbyi*). *Hydrobiologia*. **180**:65-71.  
{Keys: Behavior/ Invertebrate/ Mcell/ Ventilation}
204. Drewett, N. and P.D. Abel. 1983. Pathology of lindane poisoning and of hypoxia in the brown trout (*Salmo trutta*). *J. Fish Biol.* **23**(4):373-384.  
{Keys: Behavior/ Convulsant/ Gill damage/ Histology/ Neurotoxicity/ O<sub>2</sub>/ Pesticides/ Ventilation/ Visual}
205. Drummond, R.A. and W.A. Spoor. 1971. A method for recording responses of free-swimming animals to toxicants and deleterious environmental conditions. In: *Preprints of Papers Presented at the 162d National Meeting*. **11**:122-124. American Chemical Society, Division of Water, Air and Waste Chemistry.  
{Keys: Activity/ Copper (Cu)/ Cough/ External electrodes/ Feed/ Metal/ Trout/ Ventilation}
206. Drummond, R.A., W.A. Spoor and G.F. Olson. 1973. Some short-term indicators of sublethal effects of copper on brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* **30**(5):698-701.  
{Keys: Activity/ Cough/ External electrodes/ Feed/ Metal/ Ventilation}
207. Drummond, R.A. and W.F. Dawson. 1974. An inexpensive solid-state amplifier for detecting movements and electrical potentials of fish. *Trans. Am. Fish. Soc.* **2**:391-392.  
{Keys: Activity/ Cough/ External electrodes/ Ventilation}
208. Drummond, R.A., G.F. Olson and A.R. Batterman. 1974. Cough response and uptake of mercury by brook trout (*Salvelinus fontinalis*) exposed to mercuric compounds at different hydrogen-ion concentrations. *Trans. Am. Fish. Soc.* **103**(2):244-249.  
{Keys: Blood/ Cough/ External electrodes/ Feed/ H+/ Mercury (Hg)/ Metal/ Methyl mercury/ pH}
209. Drummond, R.A. and R.W. Carlson. 1977. Procedures for measuring cough (gill purge) rates of fish. *USEPA Ecol. Res. Series EPA-600 3-77-133*. National Technical Information Service, Springfield (VA). 55 pp.  
{Keys: Activity/ Bass/ Bluegill/ Cadmium (Cd)/ Catfish/ Chromium (Cr)/ Copper (Cu)/ Crappie/ Effluent/ *Esox* sp./ External electrodes/ *Ictalurus* sp./ *Lepomis* sp./ Mercury (Hg)/ Metal/ *Micropterus* sp./ Pesticides/ Pike/ *Pomoxis* sp./ Pressure/ Review/ Sunfish/ Trout/ Ventilation/ Zinc (Zn)}

210. Drummond, R.A., C.L. Russom, D.L. Geiger and D.L. DeFoe. 1986. Behavioral and Morphologyological changes in fathead minnow (*Pimephales promelas*) as diagnostic endpoints for screening chemicals according to mode of action. In: *Aquatic Toxicology and Environmental Fate: Ninth Volume. ASTM STP 921* (T.M. Posten and R. Purdy, eds.) pp. 415-435. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Activity/ Behavior/ Cough/ FHM/ Method/ Mode of action/ Morphology/ Ventilation}
211. Drummond, R.A. and C.L. Russom. 1990. Behavioral toxicity syndromes: A promising tool for assessing toxicity mechanisms in juvenile fathead minnows. *Environ. Toxicol. Chem.* **9**(1):37-46.  
{Keys: AChE/ Activity/ Behavior/ Convulsant/ FHM/ Method/ Mode of action/ Narcosis/ *Pimephales sp.*/ Startle/ Uncoupler/ Ventilation/ Visual}
212. Duangswasdi, M. 1977. *Organophosphate insecticide toxicity in rainbow trout (Salmo gairdneri): Effect of temperature and investigations on the sites of action.* Ph.D. Thesis. University of Manitoba, Winnipeg. 138 pp.  
{Keys: Acephate/ AChE/ Blood/ Cough/ Fenitrothion/ Heart/ Mode of action/ Organophosphorus/ Pesticides/ Pressure/ Temperature/ Ventilation}
213. Duangswasdi, M. and J.F. Klaverkamp. 1979. Acephate and fenitrothion toxicity in rainbow trout: Effects of temperature stress and investigations on the sites of action. In: *Aquatic Toxicology, Proceedings of the 2nd Annual Symposium on Aquatic Toxicology. ASTM STP 667.* (L.L. Marking and R.A. Kimerle, eds.), pp. 35-51. American Society for Testing and Materials, Philadelphia.  
{Keys: AChE/ Blood/ Buccal/ Cough/ Heart/ Mode of action/ Organophosphorus/ Pesticides/ Pressure/ Temperature/ Ventilation}
214. Durve, V S. and S.K. Dharma. 1965. Effects of anesthetics on the behaviour of mullet fingerlings and the scope of using these in different fishery procedures--I. *J. Mar. Biol. Assoc. India.* **8**:28-55.  
{Keys: Alcohol/ Amytal/ Anesthetic/ Barbital/ Behavior/ Chlorobutanol/ Chlorohydrate/ Liza/ Metabolism/ Mullet/ Urethane/ Ventilation/ Visual/ VO<sub>2</sub>}
215. Duthie, G.G. and L. Tort. 1985. Effects of dorsal aortic cannulation on the respiration and haematology of Mediterranean living *Scyliorhinus canicula* L. *Comp. Biochem. Physiol.* **81A**(4):879-883.  
{Keys: Blood/ Heart/ PaO<sub>2</sub>/ Ventilation}
216. Dutta, H.M. and J.S.D. Munshi. 1985. Functional Morphology of air-breathing fishes: A review. *P. I. A. S. -AN.* **94**(4):359-375.  
{Keys: Air breathing/ Morphology/ Review/ Ventilation}

217. Du Verney, M. 1701. Memoire sur la circulation du sang des poissons qui ont des ouies, et sur leur respiration. *Mem. Acad. Sci., Paris.* pp. 224-39.  
 {Keys: Ventilation}
218. Eclancher, B. 1975. Respiratory control in teleost fish: Respiratory responses to abrupt changes of ambient oxygen pressure. [Controle de la respiration chez les Poissons teleosteens : reactions respiratoires a des changements rectangulaires de l'oxygenation du milieu]. *C.R. Acad. Sc. Paris, Serie D.* **280**:307-310. [French].  
 {Keys: Electromyogram (EMG)/ Heart/ Impedance technology/ O<sub>2</sub>/ Ventilation}
219. Eddy, F.B. 1976. Acid-base balance in rainbow trout (*Salmo gairdneri*) subjected to acid stresses. *J. Exp. Biol.* **64**:159-171.  
 {Keys: Blood/ CO<sub>2</sub>/ H+/ Respirometry/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
220. Eisler, R. 1979. Behavioural responses of marine poikilotherms to pollutants. *Philos. Trans. R. Soc. Lond.* **286B**(1015):507-521.  
 {Keys: Activity/ Behavior/ Invertebrate/ Metal/ Oil/ Pesticides/ Review/ Swimming/ Ventilation}
221. Ellis, M.M. 1937. Detection and measurement of stream pollution. *Bulletin of the Bureau of Fisheries, No. 22, Vol. 48.* pp. 365-437. U.S. Department of Commerce, Bureau of Fisheries, Washington (D.C.).  
 {Keys: Review/ Ventilation}
222. Elshoud, G.C.A. 1978. Respiration in the three-spined stickleback (*Gasterosteus aculeatus* L.). An electromyographic approach. *Neth. J. Zool.* **28**(3-4):524-544.  
 {Keys: Attached electrodes/ Electromyogram (EMG)/ Morphology/ Temperature/ Ventilation/ Video}
223. Eriksson, L.O. and S. Ulveland. 1977. Long-term telemetric system for gillstrokes of fish. *Aquilo. Ser. Zool.* **17**:61-64.  
 {Keys: *Esox sp.*/ Pike/ Telemetric/ Ventilation}
224. Falk, D.L. and W.A. Dunson. 1977. The effects of season and acute sub-lethal exposure on survival times of brook trout at low pH. *Water Res.* **11**(1):13-15.  
 {Keys: Behavior/ H+/ pH/ *Salvelinus sp.*/ Ventilation/ Visual}
225. Farber, J. and H. Rahn. 1970. Gas exchange between air and water and the ventilation pattern in the electric eel. *Respir. Physiol.* **9**:151-161.  
 {Keys: Air breathing/ Ventilation}

226. Fay, R.R. 1970. Auditory frequency generalization in the goldfish (*Carassius auratus*). *J. Exp. Anal. Behav.* **14**:353-360.  
 {Keys: Sound/ Ventilation}
227. Feldmuth, C.R. and J.N. Baskin. 1976. Thermal and respiratory studies with reference to temperature and oxygen tolerance for the unarmored stickleback (*Gasterosteus aculeatus* Williamson Hubbs). *Bull. S. Calif. Acad. of Sci.* **75**(2):127-131.  
 {Keys: O<sub>2</sub>/ Temperature/ Ventilation/ Visual}
228. Ferreira, J.T., H.J. Schoonbee and G.L. Smit. 1984. The anaesthetic potency of benzocaine-hydrochloride in three freshwater fish species. *S. Afr. J. Zool.* **19**(1):46-50.  
 {Keys: Anesthetic/ Benzocaine/ Bream/ Carp/ *Cyprinus sp.*/ *Oreochromis sp.*/ *Salmo sp.*/ Temperature/ Trout/ Ventilation/ Visual}
229. Ferreira, P.F. Jr. and R.E. Wolke. 1979. Acute toxicity of platinum to coho salmon (*Oncorhynchus kisutch*). *Mar. Pollut. Bull.* **10**(3):79-83.  
 {Keys: Activity/ Gill damage/ Gill/ Histology/ Metal/ Platinum (Pt)/ Ventilation/ Visual}
230. Filho, I.P.T., V.M. Filho and E. Bouskela. 1991. A method for studying microcirculatory and cardio-respiratory parameters in the fish( *Hypostomus punctatus*). *Comp. Biochem. Physiol.* **99A**:41-44.  
 {Keys: Heart/ Ventilation}
231. Forster, M.E. 1981. Oxygen consumption and apnea in the shortfin eel (*Anguilla australis* schmidti). *N. Z. J. Mar. Freshwater Res.* **15**(1):85-90.  
 {Keys: Blood/ Metabolism/ O<sub>2</sub>/ PaO<sub>2</sub>/ PCO<sub>2</sub>/ PO<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
232. Forster, M.E. and L. Starling. 1982. Ventilation and oxygen consumption in the spotted stargazer (*Genyagnus monopterygius*). *N. Z. J. Mar. Freshwater Res.* **16**(2):135-140.  
 {Keys: Hypoxia/ Morphology/ O<sub>2</sub>/ PO<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
233. Forster, M.E. 1985. Blood oxygenation in shortfin eels during swimming and hypoxia: Influence of the Root effect. *N. Z. J. Mar. Freshwater Res.* **19**(2):247-251.  
 {Keys: Blood pressure/ Eel/ Heart/ PCO<sub>2</sub>/ PO<sub>2</sub>/ Swimming/ Ventilation}
234. Francois-Franck, C.A. 1906. Analyse graphique de movements respiration des poissons teleosteens. *C.R. Seances Soc. Biol. Filiales.* **60**:799-802. [French].  
 {Keys: Ventilation}

235. Frank, T.H. 1968. Telemetering the electrocardiogram of free swimming *Salmo irideus*. *IEEE Trans. Bio-Med. Eng.* **15**(2):111-114.  
{Keys: Anesthetic/ Attached electrodes/ Heart/ MS<sub>222</sub>/ Telemetry/ Urethane/ Ventilation}
236. Freadman, M.A. 1978. Hydrodynamic correlates of locomotion and gill ventilation in striped bass and bluefish. *Am. Zool.* **8**:549.  
{Keys: Activity/ Swimming/ Ventilation}
237. Freadman, M.A. 1979. Swimming energetics of striped bass (*Morone saxatilis*) and bluefish (*Pomatomus saltatrix*): Gill ventilation and swimming metabolism. *J. Exp. Biol.* **83**:217-230.  
{Keys: Attached electrodes/ Cough/ Heart/ Pressure/ Swimming/ Trout/ Uptake efficiency (UE)/ Ventilation}
238. Freadman, M.A. 1981. Swimming energetics of striped bass (*Morone saxatilis*) and bluefish (*Pomatomous saltatrix*): Hydrodynamic correlates of locomotion and gill ventilation. *J. Exp. Biol.* **90**:253-265.  
{Keys: Attached electrodes/ Swimming/ Ventilation}
239. Freeman, J.A. 1950. Oxygen consumption, brain metabolism and respiratory movements of goldfish during temperature acclimatization, with special reference to lowered temperatures. *Biol. Bull., Wood's Hole.* **99**:416-424.  
{Keys: *Carassius sp.*/ Temperature/ Ventilation/ Visual/ VO<sub>2</sub>}
240. Fromm, P.O. and R.H. Schiffman. 1958. Toxic action of hexavalent chromium on largemouth bass. *J. Wildl. Manag.* **22**(1):40-44.  
{Keys: Chromium (Cr)/ Cough/ Metal/ *Micropterus sp.*/ Morphology/ Ventilation/ Visual/ VO<sub>2</sub>}
241. Fromm, P.O. 1980. A review of some physiological and toxicological responses of freshwater fish to acid stress. *Environ. Biol. Fishes* **5**(1):79-93.  
{Keys: Behavior/ Blood/ CO<sub>2</sub>/ Gill damage/ H+/ pH/ Review/ Salmonid/ Ventilation volume (VG)}
242. Fry, F.E.J. 1957. The aquatic respiration of fish. In: *The Physiology of Fishes, Vol. 1* (M.E. Brown, ed), pp. 1-63. Academic Press, New York.  
{Keys: CO<sub>2</sub>/ O<sub>2</sub>/ Review/ Temperature/ Ventilation}
243. Fukuda, H. 1975. Effects of transections and electrical coagulations in the medulla oblongata upon the activities in the respiratory muscles of the crucian carp (*Carassius carassius* L.). *J. Physiol. Soc. Jpn.* **37**(7):125-136. [Japanese].  
{Keys: Brain/ Morphology/ Nervous system/ Ventilation}

244. Fukuda, H., F. Ohyama and K.S. Iwata. 1977. Types and localizations of the medullary respiratory neurons in the crucian carp (*Carassius carassius* L.). *Zool. Mag. Zool. Soc. Jpn.* **86**(3):222-231. [Japanese].  
 {Keys: Attached electrodes/ Brain/ Nervous system/ Ventilation}
245. Fukuda, H. 1978. On the rostral border of the respiratory center in the crucian carp (*Carassius carassius* L.). *Zool. Mag. Zool. Soc. Jpn.* **87**(1):26-31. [Japanese].  
 {Keys: Attached electrodes/ Brain/ Morphology/ Nervous system/ Ventilation}
246. Garey, W.F. and H. Rahn. 1970. Normal arterial gas tensions and pH and the breathing frequency of the electric eel. *Respir. Physiol.* **9**:141-150.  
 {Keys: Blood/ CO<sub>2</sub>/ Heart/ O<sub>2</sub>/ Ventilation/ Visual}
247. Gee, J.H., R.F. Tallman and H.J. Smart. 1978. Reactions of some great plains fishes to progressive hypoxia. *Can. J. Zool.* **56**:1962-1966.  
 {Keys: *Ambloplites* sp./ Behavior/ *Catostomus* sp./ *Chrosomus* sp./ *Coregonus* sp./ *Culaea* sp./ *Esox* sp./ *Etheostoma* sp./ Fathead minnow/ *Hybognathus* sp./ *Ictalurus* sp./ *Nocomis* sp. / *Notropis* sp./ *Noturus* sp./ O<sub>2</sub>/ *Perca* sp./ *Percina* sp./ *Pimephales* sp./ *Pungitius* sp./ *Rhinichthys* sp./ *Salmo* sp./ Salmonid/ *Salvelinus* sp./ *Semotilus* sp./ *Stizostedion* sp./ Temperature/ Ventilation/ Visual}
248. Gee, J.H. 1980. Respiratory patterns and antipredator responses in the central mudminnow (*Umbra limi*) a continuous, facultative, air-breathing fish. *Can. J. Zool.* **58**:819-827.  
 {Keys: Activity/ Air breathing/ Hypoxia/ O<sub>2</sub>/ Temperature/ Ventilation/ Visual}
249. Gehrke, P.C. 1988. Acute cardio-respiratory responses of spangled perch (*Leiopotherapon unicolor* Guenther 1859), to sublethal concentrations of zinc, temephos and 2, 4-D. *Aust. J. Mar. Freshwater Res.* **39**(6):767-774.  
 {Keys: 2, 4-D (herbicide)/ AChE/ Heart/ Heart frequency (fh)/ Metal/ Pesticides/ Ventilation frequency (fv)/ VO<sub>2</sub>/Zinc (Zn)}
250. Gehrke, P.C. and D.R. Fielder. 1988. Effects of temperature and dissolved oxygen on heart rate, ventilation rate and oxygen consumption of spangled perch (*Leiopotherapon unicolor* Gunther 1859). *J. Comp. Physiol.* **157B**(6):771-782.  
 {Keys: Cough/ External electrodes/ Heart/ Hypoxia/ O<sub>2</sub>/ Respirometry/ Temperature/ Ventilation/ VO<sub>2</sub>}
251. Gerhardt, A., E. Svensson, M. Clostermann and B. Fridlund. 1994. Monitoring of behavioral patterns of aquatic organisms with an impedance conversion technique. *Environ. Internat.* **20**(2):209-219.  
 {Keys: Activity/ *Baetis* sp./ Behavior/ *Daphnia* sp./ *Dinocras* sp./ External electrodes/ Feed/ *Gammarus* sp./ *Hydropsyche* sp./ Impedance technology/ *Leptophlebia* sp./ Method/ *Rana* sp./ *Sialis* sp./ Swimming/ Ventilation}

252. Gibson, R.N. 1967. The use of the anaesthetic quinaldine in fish ecology. *J. Anim. Ecol.* **36**:295-301.  
{Keys: *Acanthocottus sp.*/ Anesthetic/ *Blennius sp.*/ *Ciliata sp.*/ *Gobius sp.*/ Mode of action/ *Pholis sp.*/ Quinaldine/ Ventilation/ Visual}
253. Glass, M., W.W. Burggren and K. Johansen. 1978. Ventilation in an aquatic and a terrestrial chelonian reptile. *J. Exp. Biol.* **72**:165-179.  
{Keys: Air breathing/ Tortoise/ Turtle/ Ventilation}
254. Gobas, F.A.P.C. and D. Mackay. 1987. Dynamics of hydrophobic organic chemical bioconcentration in fish. *Environ. Toxicol. Chem.* **6**(7):495-504.  
{Keys: Uptake efficiency (UE)/ Ventilation frequency (fv)}
255. Goodman, D.A. and N.M. Weinberger. 1971. Submerged electrodes in an aquarium: Validation of a technique for remote sensing of behaviour. *Behav. Res. Meth. Instrum.* **3**(6):281-286.  
{Keys: Activity/ Amphibian/ Attached electrodes/ Behavior/ Heart/ *Necturus sp.*/ Ventilation}
256. Goodnight, C.J. 1942. Toxicity of sodium pentachlorphenate and pentachlorophenol to fish. *Indus. Eng. Chem.* **34**:868-872.  
{Keys: Invertebrate/ Metabolism/ Minnow/ NaPCP/ PCP/ Uncoupler/ Ventilation/ Visual/ VO<sub>2</sub>}
257. Gradwell, N. 1972. On the interactions between suctorial adhesion, gill ventilation and opercular spine erection in *Xnocara occidentalis*. *J. Exp. Biol.* **57**:771-788.  
{Keys: *Ascaphus sp.*/ Buccal/ Catfish/ Cough/ Electromyogram (EMG)/ Pressure/ Ventilation}
258. Graham, J.B., D.L. Kramer and E. Pineda. 1978. Comparative respiration of an air-breathing and a non-air-breathing characoid fish and the evolution of aerial respiration in characins. *Physiol. Zool.* **51**(3):279-288.  
{Keys: Air breathing/ *Piabucina sp.*/ Ventilation/ VO<sub>2</sub>}
259. Graham, J.B., C.B. Jones and I. Rubinoff. 1985. Behavioural, physiological, and ecological aspects of the amphibious life of the pearl blenny (*Entomacrodus nigricans* Gill). *J. Exp. Mar. Biol. Ecol.* **89**(2-3):255-268.  
{Keys: Air breathing/ Ventilation}
260. Graham, J.B. 1997. *Air-breathing Fishes. Evolution, Diversity, and Adaptation*. Academic Press, San Diego (CA). 299 pp.  
{Keys: Air breathing/ Blood/ Cardiovascular system/ Ventilation}

261. Grant, C.M. 1959. The action of nitrophenols on the pulmonary ventilation of rats. *Br. J. Pharmacol.* **14**:401-403.  
{Keys: Mammal/ Uncoupler/ Ventilation}
262. Gruber, D., J. Cairns Jr., K.L. Dickson, R. Hummel III., A. Maciorowski and W.H. van der Schalie. 1977. An inexpensive noise-immune amplifier designed for computer monitoring of ventilatory movements of fish and other biological events. *Trans. Am. Fish. Soc.* **106**(5):497-499.  
{Keys: External electrodes/ Ventilation}
263. Gruber, D., J. Cairns Jr., K.L. Dickson and A.C. Hendricks. 1977. Progress on a second generation of an automated continuous biological monitoring system. In: *Contributed Papers, 143rd National Meeting, Paper No. 188* (M.P. Dunford, ed.). American Association for the Advancement of Science, Washington (DC). 10 pp.  
{Keys: External electrodes/ Ventilation}
264. Gruber, D., J. Cairns Jr., K.L. Dickson, A.C. Hendricks, M.A. Cavell, J.D. Landers Jr., W. R. Miller III and W.J. Showalter. 1978. The construction, development, and operation of a fish biological monitoring system. *Contractor Report ARCSL-CR-78040*. National Technical Information Service, Springfield (VA). 79 pp.  
{Keys: Bluegill/ Chlorine (Cl)/ Effluent/ External electrodes/ *Lepomis sp.*/ Ventilation}
265. Gruber, D., J. Cairns Jr. and A.C. Hendricks. 1979. A computerized biological monitoring facility for demonstrating wastewater discharge compliance. In: *Proceedings of the Industrial Wastes Symposia. 52d Annual Water Pollution Control Federation Conference* (K. Watson, ed.). 12 pp.  
{Keys: Bluegill/ External electrodes/ *Lepomis sp.*/ Ventilation}
266. Gruber, D., J. Cairns Jr., K.L. Dickson and A.C. Hendricks. 1979. A cinematographic investigation into the fish's bioelectric breathing signal. *J. Fish Biol.* **14**:429-436.  
{Keys: Bluegill/ Chlorine (Cl)/ Cough/ External electrodes/ Fathead minnow/ *Lepomis sp.*/ *Pimephales sp.*/ Ventilation/ Video}
267. Gruber, D., J. Cairns Jr., K.L. Dickson, A.C. Hendricks and W.R. Miller III. 1979. Initial testing of a recent biological monitoring concept. *J. Water Pollut. Contr. Fed.* **51**(11):2744-2751.  
{Keys: Bluegill/ Chlorine (Cl)/ Effluent/ External electrodes/ *Lepomis sp.*/ Ventilation}

268. Gruber, D. 1980. Demonstrating wastewater discharge compliance with an automated biological monitoring system. In: *Proceedings of the 8th Annual WWEMA Industrial Pollution Conference*. 4-6 June 1980. Houston (TX). pp. 115-124. Water and Wastewater Equipment Manufacturers Association, Inc., McLean (VA). {Keys: Bluegill/ External electrodes/ *Lepomis sp.*/ Ventilation}
269. Gruber, D., J. Cairns Jr., K.L. Dickson, A.C. Hendricks and W.R. Miller III. 1980. Recent concepts and development of an automated biological monitoring system. *J. Water Pollut. Contr. Fed.* **52**(3):465-471. {Keys: Bluegill/ Chlorine (Cl)/ Effluent/ External electrodes/ *Lepomis sp.*/ Ventilation}
270. Gruber, D., K.L. Dickson, A.C. Hendricks and W.R. Miller III. 1980. An automated biological monitoring facility for rapidly and continuously assessing industrial effluents. In: *Aquatic Toxicology, ASTM STP 707*. (J.G. Eaton, P.R. Parrish and A.C. Hendricks, eds.), pp. 164-176. American Society for Testing and Materials, Philadelphia (PA). {Keys: Bluegill/ Chlorine (Cl)/ Effluent/ External electrodes/ *Lepomis sp.* / Ventilation}
271. Gruber, D. and J. Cairns Jr. 1981. Data acquisition and evaluation in biological monitoring systems. *Hydrobiol.* **83**(3):387-393. {Keys: Bluegill/ External electrodes/ *Lepomis sp.*/ Ventilation}
272. Gruber, D. and J. Cairns Jr. 1981. Industrial effluent monitoring incorporating a recent automated fish biomonitoring system. *Water Air Soil Pollut.* **15**(4):471-481. {Keys: Bluegill/ Effluent/ External electrodes/ *Lepomis sp.*/ Ventilation}
273. Gruber, D., J. Cairns Jr. and A.C. Hendricks. 1981. Computerized biological monitoring for demonstrating wastewater discharge. *J. Water Pollut. Contr. Fed.* **53**(4):505-511. {Keys: Bluegill/ External electrodes/ *Lepomis sp.*/ Ventilation}
274. Gruber, D. and W.R. Miller III. 1982. Assessing industrial wastewater with a continuous and automated on-line toxicity monitoring system. *Can. Tech. Rep. Fish. Aquat. Sci. No. 1163* (W.C. Makay, ed.), pp. 57-68. (Proceedings of the 9th Annual Aquatic Toxicity Workshop. 1-5 Nov 1982. Edmonton (Alberta). {Keys: Bluegill/ Effluent/ External electrodes/ *Lepomis sp.*/ Ventilation}
275. Gruber, D. and J.M. Diamond, eds. 1988. *Automated Biomonitoring: Living Sensors as Environmental Monitors*. Ellis Horwood Limited, Chichester (England). 208 pp. {Keys: Behavior/ Cough/ Ventilation}

276. Gruber, D. 1988. A historical perspective. In: *Automated Biomonitoring: Living Sensors as Environmental Monitors* (D. Gruber and J.M. Diamond, eds.), pp. 15-22. Ellis Horwood Limited, Chichester (England). 208 pp.  
{Keys: Behavior/ Cough/ Ventilation}
277. Gruber, D., et al. 1989. Use of an automated real-time biomonitoring system for assessing water quality at the Los Angeles Aqueduct Filtration Plant. In: *Proceedings of the Annual Conference*. pp. 1315-1326. American Water Works Association, Denver (CO).  
{Keys: Behavior/ Cough/ Ventilation}
278. Gruber, D., J.M. Diamond and D. Johnson. 1989. Performance and validation of an on-line fish ventilatory early warning system. In: *Aquatic Toxicology and Environmental Fate: Eleventh Volume. ASTM STP 1007* (G.W. Suter II. and M.A. Lewis, eds.), pp. 215-230. American Society for Testing and Materials, Philadelphia.  
{Keys: Behavior/ Cough/ Ventilation}
279. Gruber, D., C.H. Frago and W.J. Rasnake. 1994. Automated biomonitor: First line of defense. *J. Aquat. Ecosyst. Health.* 3(2):87092.  
{Keys: Ventilation}
280. Gupta, S.P., S.R. Verma and R.C. Dalela. 1979. Studies on the toxicity of a few pesticides on *Colisa fasciatus* and *Notopterus notopterus* with reference to histopathology and histochemistry. Part I: Bioassay studies. *Acta Hydrochim. Hydrobiol.* 7(2):223-238.  
{Keys: Cyclodiene/ Organophosphorus/ Parathion/ Ventilation/ Visual/ VO<sub>2</sub>}
281. Gusel'nikov, V.I. 1962. Methods of study of bioelectric brain activity. In: *Techniques for the Investigation of Fish Physiology* (E.N. Pavlovskii, ed.). Akademiya Nauk SSSR, Ikhthiologicheskaya Komissiya. Translated from the Russian by Israel Program for Scientific Translations. 1964. pp. 258-266. U.S. Dept. of the Interior and the National Science Foundation.  
{Keys: Brain/ EEG/ Thermistor/ Ventilation}
282. Haeser, P.E. and G. Werner. 1980. Reduced oxygen consumption and reduced opercular movements in fishes by heavy water (D<sub>2</sub>O). [Verminderter sauerstoffverbrauch und reduzierte Atemfrequenz verursacht durch 'Schweres Wasser' (D<sub>2</sub>O) bei Fischen]. *Z. Naturforsch. Ser. C* 35(7-8):665-668. [German]. (*Aquat. Sci. Fish. Abstr.* 11).  
{Keys: D<sub>2</sub>O/ *Scardinius sp.*/ Ventilation VO<sub>2</sub>}
283. Hagerman, L. 1982. Heart rate and ventilatory behaviour of young lobsters (*Homarus gammarus* L.). during hypoxia. *Ophelia*. 21(2):223-229.  
{Keys: Invertebrate/ O<sub>2</sub>/ PO<sub>2</sub>/ Ventilation}

284. Halsband, E. 1953. Investigations on the content of forelle (*Trutta iridea* W. Gibb.) and doble (*Squalus cephalus* Heck) by development of common relationships. *Zeit. F. Fisch. V. D. Hilfswiss.* 2(NF):228-270. [Untersuchungen über das Verhalten von Forelle (*Trutta iridea* W. Gibb) und Dobel (*Squalius cephalus* Heck) bei Einwirkung verschiedener Ausenfaktoren].  
{Keys: External electrodes/ Temperature/ *Salmo Trutta* / Ventilation}
285. Halsband, E. 1955. A new method for investigation of breathing frequency measurements on injury of waste substances. [Eine neue Methodik der Atemfrequenzmessung zur Untersuchung der Schadlichkeit von Abwassergiften]. *Arch. F. Hydrobiol. Suppl.* 22:323-328.  
{Keys: Ammonia/ Calcium (Ca)/ External electrodes/ HCl/ Metal/ Phenol/ Ventilation}
286. Halsband, E. and I. Halsband. 1968. An apparatus for measuring the intensity of metabolism of fish and fishfood animals. [Eine apparatur zur messung der Stoffwechselintensitat von Fischen und Fischnahrtieren]. *Arch. F. Fischereiwiss.* 19(1):78-82. Translated by R.M. Howland. Fish Control Laboratory. Bureau of Sport Fisheries and Wildlife, LaCrosse (WI).  
{Keys: Attached electrodes/ Metabolism/ Ventilation}
287. Hanson, D. and K. Johansen. 1970. Relationship of gill ventilation and perfusion in the Pacific dogfish (*Squalus suckleyi*). *J. Fish. Res. Board Can.* 27:551-564.  
{Keys: Atropine/ Blood/ Heart/ O<sub>2</sub>/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
288. Hanyu, I., K. Tsukamoto, K. Yamamori, P.V. Ngan, K. Furukawa and T. Hibiya. 1979. Simultaneous recording of physiological information from swimming fish. *Bull. Jpn. Soc. Sci. Fish.* 45(10):1261-1265.  
{Keys: Attached electrodes/ Blood/ Electromyogram (EMG)/ Heart/ Swimming/ Ventilation/ VO<sub>2</sub>/ Yellowtail}
289. Hara, S. 1924. Über die wirkung verschiedener Narkotica auf die atmung des Goldblatt (*Pleuronectes platessa*). *Z. Ges. Exp. Med.* 43:256-269.  
{Keys: Adalin/ Anesthetic/ Sulfonal/ Trional/ Ventilation}
290. Hardie, M.G., J.C. Jennett, E. Bolter, B. Wixson and N. Gale. 1974. Water resources problems and solutions associated with the new lead belt of S.E. Missouri. *Water Resources Problems Related to Mining, Proc. No. 18.* pp. 109-122. American Water Resources Association.  
{Keys: Lead (Pb)/ Metal/ Ventilation}

291. Hargis, J.R. 1976. Ventilation and metabolic rate of young rainbow trout (*Salmo gairdneri*) exposed to sublethal environmental pH. *J. Exp. Zool.* **196**:39-44.  
{Keys: Cough/ Metabolism/ Respirometry/ Swimming/ Ventilation/ VO<sub>2</sub>}
292. Hargis, K.J., K.W. Eagleson and E.L. Morgan. 1978. Automated breathing rate monitor for measuring respiratory synchrony in schooling and nonschooling fish. *Assoc. Southeast. Biol. Bull.* **25**(2):80.  
{Keys: Behavior/ Ventilation}
293. Harichaux, P. and J. Gorin. 1976. Respiratory function of freshwater fish under conditions of aquatic rebreathing and semi-breathing. *Rev. Intern. Oceanogr. Med.* **43**:97-110.  
{Keys: Ventilation}
294. Harichaux, P. and J. Gorin. 1976. Continuous and extended measurement of the respiratory function in the rainbow trout (*Salmo irideus*). *Ann. Hydrobiol.* **7**(2): 91-96.  
{Keys: Ventilation}
295. Harris, J.H. 1995. The use of fish in ecological assessments. *Aust. J. Ecol.* **20**(1):65-80.  
{Keys: Review/ Ventilation}
296. Hayward, R.S., N.G. Reichenbach, K.L. Dickson and T.J. Wildoner Jr. 1988. Variability among bluegill ventilatory rates for effluent toxicity biomonitoring. *Water Res.* **22**(10):1311-1316.  
{Keys: Ventilation}
297. Heath, A.G. 1972. A critical comparison of methods for measuring fish respiratory movements. *Water Res.* **6**(1):1-7.  
{Keys: Attached electrodes/ Buccal/ External electrodes/ Pressure/ Ventilation volume (VG)/ Visual}
298. Heath, A.G. 1973. Ventilatory responses of teleost fish to exercise and thermal stress. *Am. Zool.* **13**:491-503.  
{Keys: Swimming/ Temperature/ Ventilation}
299. Heath, A.G. and G.M. Hughes. 1973. Cardiovascular and respiratory changes during heat stress in rainbow trout (*Salmo gairdneri*). *J. Exp. Biol.* **59**:323-338.  
{Keys: Heart/ Temperature/ Ventilation}
300. Heath, A.G. 1987. *Water Pollution and Fish Physiology*. CRC Press, Inc., Boca Raton, FL. 245pp.  
{Keys: Cardiovascular system/ Cough frequency (fc)/ EKG/ External electrodes/ Gill damage/ Gill/ Heart/ Morphology/ Pressure/ Ventilation frequency (fv)/ VO<sub>2</sub>}

301. Heath, A.G. 1995. *Water Pollution and Fish Physiology*. 2nd edn. CRC Press, Inc., Lewis Publishers, Boca Raton, FL. 359 pp.  
{Keys: AChE/ Acid/ Activity/ Behavior/ Blood/ Cardiovascular system/ Chemosensitive/ Cough/ Feed/ Heart/ Hypoxia/ Locomotion/ Metal/ Method/ Nervous system/ Olfactory/ Pesticides/ Predator/ Reproduction/ Review/ Swimming/ Ventilation}
302. Hedner, J., T. Hedner, P. Wessberg and J. Jonason. 1984. An analysis of the mechanism by which  $\gamma$ -aminobutyric acid depresses ventilation in the rat. *J. Appl. Physiol. Respir. Environ. Exercise. Physiol.* **56**(4):849-856.
303. Heimstra, N.W., D.K. Damkot and N.G. Benson. 1969. Some effects of silt turbidity on behavior of juvenile largemouth bass and green sunfish. *Bureau of Sport Fisheries and Wildlife, Technical Paper No. 20*. pp. 3-9. U.S. Department of the Interior, Fish and Wildlife Service, Washington (D.C.).  
{Keys: Behavior/ Suspended solids/ Turbidity/ Ventilation}
304. Hejduk, J. and Svobodova. 1980. Acute toxicity of carbamate-based pesticides for fish. *Acta Vet. BRNO.* **49**(3-4):251-257.  
{Keys: Carbamate/ Pesticides}
305. Hellstroem, T. and K.B. Doeving. 1983. Observations of cod behaviour when stimulated with water soluble fractions of oil. In: *Chemoreception in Studies of Marine Pollution, Reports from a Workshop at Oslo, July 13 and 14, 1980* (K.B. Doeving, ed.), pp. 69-85. Rep. Forskningsprogram Havforurens (NORW). Norw. Mar. Pollut. Res. Monit. Programme, No 1.  
{Keys: Behavior/ Cough/ *Gadus sp.* / Oil/ Respirometry/ Seawater/ Swimming}
306. Heming, T.A., E.L. Meyn and R.K. Zajdel. 1985. Acute toxicity of thiocyanate to trout. *Trans. Am. Fish. Soc.* **114**(6):895-905.  
{Keys: Ventilation}
307. Henry, J.A.C. and A.H. Houston. 1984. Absence of respiratory acclimation to diurnally cycling temperature conditions in rainbow trout. *Comp. Biochem. Physiol.* **77A**(4):727-734.  
{Keys: Heart/ Heart frequency (fh)/ Temperature/ Uptake efficiency (UE)/ Ventilation frequency (fv)/  $VO_2$ }
308. Henry, M.G. and G.J. Atchison. 1979. Influence of social rank on the behavior of bluegill (*Lepomis macrochirus* Rafinesque) exposed to sublethal concentrations of cadmium and zinc. *J. Fish Biol.* **15**:309-315.  
{Keys: Activity/ Behavior/ Cadmium (Cd)/ Cough/ Metal/ Swimming/ Ventilation/ Zinc (Zn)}

309. Henry, M.G. and G.J. Atchison. 1979. Behavioral changes in bluegill (*Lepomis macrochirus*) as indicators of sublethal effects of metals. *Environ. Biol. Fishes.* 4:37-42.  
{Keys: Behavior/ Cadmium (Cd)/ Cough/ Metal/ Swimming/ Ventilation/ Zinc (Zn)}
310. Henry, M.G. and G.J. Atchison. 1984. Behavioral effects of methyl parathion on social groups of bluegill (*Lepomis macrochirus*). *Environ. Toxicol. Chem.* 3(3):399-408.  
{Keys: Activity/ Behavior/ Ventilation}
311. Henry, M.G. and G.J. Atchison. 1986. Behavioral changes in social groups of bluegills exposed to copper. *Trans. American Fish. Soc.* 115(4):590-595.  
{Keys: Activity/ Behavior/ Bluegill/ Copper (Cu)/ Cough/ *Lepomis* sp./ Ventilation}
312. Henry, M.G. 1986. The use of fish behavior in comparing toxic effects of three chemicals. In: *Problems of Aquatic Toxicology, Biotoxins and Water Quality Management: Proceedings of USA-USSR Symposium. Borok, Jaroslavl Oblast. 30 July-1 August 1984. EPA-600 9-86-024.* pp. 31-36.  
{Keys: Behavior/ Chlordane/ Copper (Cu)/ Cough/ Parathion}
313. Hikasa, Y., K. Takase, T. Ogasawara and S. Ogasawara. 1986. Anesthesia and recovery with tricaine methanesulfonate, eugenol and thiopental sodium in the carp (*Cyprinus carpio*). *Jpn. J. Vet. Sci.* 48(2):341-351.  
{Keys: Anesthetic/ MS<sub>222</sub>/ Ventilation}
314. Hipkins, S.F. and D.G. Smith. 1983. Cardiovascular events associated with spontaneous apnea in the Australian short-finned eel (*Anguilla australis*). *J. Exp. Zool.* 227(3):339-348.  
{Keys: Blood pressure/ Buccal/ Heart frequency (fh)/ Ventilation}
315. Hodgson, A.N. 1982. Some behavioural and electrical responses of *Scrobicularia plana* Bivalvia: Tellinacea to siphonal wounding. *J. Molluscan Stud.* 48(1):87-95.  
{Keys: Heart/ Invertebrate/ Nerve/ Ventilation}
316. Hoglund, L.B. 1961. The reactions of fish in concentration gradients. *Report No. 43. Institute Freshwater Res., Drottningholm.* 147 pp.  
{Keys: Activity/ CO<sub>2</sub>/ O<sub>2</sub>/ pH/ Sulfite/ Ventilation}
317. Holcombe, G.W., G.L. Phipps and D.K. Tanner. 1982. The acute toxicity of kelthane, dursban, disulfoton, pydrin, and permethrin to fathead minnows (*Pimephales promelas*) and rainbow trout (*Salmo gairdneri*). *Environ. Pollut., Ser. A.* 29:167-178.  
{Keys: Cough/ Cough frequency (fc)/ Fathead minnow/ Pesticides/ Pyrethroid/ Ventilation frequency (fv)/ Ventilation}

318. Holeton, G.F. and D.J. Randall. 1967. Changes in blood pressure in rainbow trout during hypoxia. *J. Exp. Biol.* **46**:297-305.  
{Keys: Blood pressure/ Heart/ Ventilation frequency (fv)}
319. Holeton, G.F. and D.J. Randall. 1967. The effect of hypoxia upon the partial pressure of gasses in the blood and water afferent and efferent to the gills of rainbow trout. *J. Exp. Biol.* **46**:317-327.  
{Keys: O<sub>2</sub>/ Ventilation}
320. Holeton, G.F. 1971. Oxygen uptake and transport by the rainbow trout during exposure to carbon monoxide. *J. Exp. Biol.* **54**:239-254.  
{Keys: Blood pressure/ CO/ Heart/ Pike/ PO<sub>2</sub>/ Temperature/ Uptake efficiency (UE)/ Ventilation}
321. Holeton, G.F. 1971. Respiratory and circulatory responses of rainbow trout larvae to carbon monoxide and to hypoxia. *J. Exp. Biol.* **55**:683-694.  
{Keys: Blood/ CO/ Heart/ Ventilation}
322. Holeton, G.F. and D.R. Jones. 1975. Water flow dynamics in the respiratory tract of the carp (*Cyprinus carpio*). *J. Exp. Biol.* **63**:537-549.  
{Keys: Buccal/ Cough/ Morphology/ Pressure/ Ventilation}
323. Holeton, G.F. 1977. Constancy of arterial blood pH during CO-induced hypoxia in the rainbow trout. *Can. J. Zool.* **55**:1010-1013.  
{Keys: Blood pressure/ CO/ Heart/ Hypoxia/ Ventilation}
324. Holeton, G.F., M.G. Pawson and G. Shelton. 1982. Gill ventilation, gas exchange, and survival in the Atlantic mackerel (*Scomber scombrus* L.). *Can. J. Zool.* **60**(5):1141-1147.  
{Keys: Blood/ PaO<sub>2</sub>/ PCO<sub>2</sub>/ Swimming/ Ventilation}
325. Holmberg, B., S. Jensen, A. Larsson, K. Lewander and M. Olsson. 1972. Metabolic effects of technical pentachlorophenol (PCP) on the eel (*Anguilla anguilla* L.). *Comp. Biochem. Physiol.* **43B**:171-183.  
{Keys: Blood/ Metabolism/ PCP/ Seawater/ Uncoupler/ Ventilation}
326. Horkel, J.D. and W.D. Pearson. 1976. Effects of turbidity on ventilation rates and oxygen consumption of green sunfish (*Lepomis cyanellus*). *Trans. Am. Fish. Soc.* **105**(1):107-113.  
{Keys: Suspended solids/ Temperature/ Ventilation/ VO<sub>2</sub>}

327. Houston, A.H., J.A. Madden, R.J. Woods and H.M. Miles. 1971. Some physiological effects of handling and tricaine methane sulfonate anesthetization upon the brook trout (*Salvelinus fontinalis*). *J. Fish. Res. Board Can.* **28**:625-633.  
 {Keys: Anesthetic/ Blood/ Heart/ MS<sub>222</sub>/ Ventilation}
328. Houston, A.H., J.A. Madden, R.J. Woods and H.M. Miles. 1971. Variations in the blood and tissue chemistry of brook trout (*Salvelinus fontinalis*) subsequent to handling, anesthesia, and surgery. *J. Fish. Res. Board Can.* **28**:635-642.  
 {Keys: Anesthetic/ Blood/ Heart/ Ventilation}
329. Houston, A.H., C.L. Czerwinski and R.J. Woods. 1973. Cardiovascular-respiratory activity during recovery from anaesthesia and surgery in brook trout (*Salvelinus fontinalis*) and carp (*Cyprinus carpio*). *J. Fish. Res. Board Can.* **30**:1705-1712.  
 {Keys: Anesthetic/ Blood/ Buccal/ Heart/ Urine/ Ventilation volume (VG)/ VO<sub>2</sub>}
330. Houston, A.H., J.T. Corlett and R.J. Woods. 1976. Specimen weight and MS<sub>222</sub>. *J. Fish. Res. Board Can.* **33**:1403-1407.  
 {Keys: Anesthetic/ MS<sub>222</sub>/ Ventilation}
331. Howard, T.E. 1973. *Effects of kraft mill effluents on the swimming stamina, temperature tolerance and respiration of some salmonid fish*. Ph.D. Thesis, University of Strathclyde, Scotland. 125 pp.  
 {Keys: Effluent/ Swimming/ Temperature/ Ventilation}
332. Howard, T.E. and C.C. Walden. 1974. Measuring stress in fish exposed to pulp mill effluents. *Tappi*. **57**(2):133-135.  
 {Keys: Blood/ Effluent/ Swimming/ Temperature/ Ventilation}
333. Huang, Y., L. Mu, J. Ma, L. Liu, W. Lin and L. Lu. 1988. Effects of heavy metal ions on cough response of mud carp. [Zhongjinshu lizi (Hg<sup>2+</sup>, Cu<sup>2+</sup>, Ag<sup>+</sup> duilinyu kesuo fanying de yingxiang]. *Acta Sci. Circumstant. Huanjing Kexue Xueba*. **8**(2):216-222. [Chinese].  
 {Keys: Copper (Cu)/Cough frequency (fc)/ Mercury (Hg)/ Metal/ Mixtures}
334. Hughes, G.M. and G. Shelton. 1957. Pressure changes during the respiratory movements of teleostean fishes. *Nature*. **453**:255.  
 {Keys: Buccal/ Ventilation}
335. Hughes, G.M. and G. Shelton. 1958. The mechanism of gill ventilation in three freshwater teleosts. *J. Exp. Biol.* **35**:807-823.  
 {Keys: Anesthetic/ Buccal/ Cough/ *Esox sp.*/ *Leuciscus sp.*/ Pike/ Roach/ *Salmo sp.*/ Tench/ *Tinca sp.*/ Trout/ Urethane/ Ventilation/ Video}

336. Hughes, G.M. 1960. A comparative study of gill ventilation in marine teleosts. *J. Exp. Biol.* **37**:28-45.  
{Keys: Anesthetic/ *Blennius* sp./ Blenny/ Buccal/ Bullhead/ *Callionymus* sp./ *Clupea* sp./ *Conger* sp./ *Cottus* sp./ Cough/ *Crenilabrus* sp./ *Dragonet* sp./ Eel/ *Gadus* sp./ Gurnard/ Herring/ Mackerel/ *Microstomus* sp./ MS<sub>222</sub>/ *Onos* sp./ Pipefish/ Plaice/ *Pleuronectes* sp./ Pressure/ Rockling/ Sole/ *Syngnathus* sp./ *Trachurus* sp./ *Trigla* sp./ Urethane/ Ventilation/ Whiting/ Wrasse}
337. Hughes, G.M. 1960. The mechanism of gill ventilation in the dogfish and skate. *J. Exp. Biol.* **37**:11-27.  
{Keys: Buccal/ Ventilation}
338. Hughes, G.M. 1961. Gill ventilation in fish. *Rep. Challenger Soc.* **13**(3):23-24.  
{Keys: Ventilation}
339. Hughes, G.M. and G. Shelton. 1962. Respiratory mechanisms and their nervous control in fish. In: *Advances in Comp. Physiol. Biochem.* (O. Lowenstein, ed.), pp. 275-364. Academic Press, New York.  
{Keys: Ventilation}
340. Hughes, G.M. 1963. *The Comparative Physiology of Vertebrate Respiration*. Heineman, London. 145 pp.  
{Keys: Ventilation}
341. Hughes, G.M. 1964. Fish respiratory homeostasis. *Symp. Soc. Exp. Biol.* **18**:81-107.  
{Keys: Ventilation}
342. Hughes, G.M. 1966. The dimensions of fish gills in relation to their function. *J. Exp. Biol.* **45**:177-195.  
{Keys: Morphology/ Ventilation}
343. Hughes, G.M. and C.M. Ballintijn. 1968. Electromyography of the respiratory muscles and gill water flow in the dragonet. *J. Exp. Biol.* **49**:583-602.  
{Keys: Electromyogram (EMG)/ Ventilation}
344. Hughes, G.M. and B. Knights. 1968. The effect of loading the respiratory pumps on the oxygen consumption of *Callionymus lyra*. *J. Exp. Biol.* **49**:603-615.  
{Keys: Ventilation}
345. Hughes, G.M. and S.I. Umezawa. 1968. Oxygen consumption and gill water flow in the dogfish (*Scyliorhinus canicula* L.). *J. Exp. Biol.* **49**:557-564.  
{Keys: Ventilation}

346. Hughes, G.M. and S.I. Umezawa. 1968. On respiration in the dragonet (*Callionymus lyra*). *J. Exp. Biol.* **49**:565-582.  
{Keys: Ventilation}
347. Hughes, G.M. and J.L. Roberts. 1969. Gill ventilation in the scup, sea robin, sculpin and the toadfish. *Am. Zool.* **9**(4):225.  
{Keys: Ventilation}
348. Hughes, G.M. 1970. A comparative approach to fish respiration. *Experientia*. **26**(2):113-224.  
{Keys: Ventilation}
349. Hughes, G.M. and J.L. Roberts. 1970. A study of the effect of temperature changes on the respiratory pumps of the rainbow trout. *J. Exp. Biol.* **52**:177-192.  
{Keys: Anesthetic/ Buccal/ Cough/ Heart/ MS<sub>222</sub>/ Pressure/ *Salmo sp.*/ Temperature/ Trout/ Ventilation}
350. Hughes, G.M. and R.L. Saunders. 1970. Responses of the respiratory pumps to hypoxia in the rainbow trout (*Salmo gairdneri*). *J. Exp. Biol.* **53**:529-545.  
{Keys: Buccal/ PO<sub>2</sub>/ Pressure/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
351. Hughes, G.M. and B.N. Singh. 1970. Respiration in an air-breathing fish, the climbing perch (*Anabas testineus* Bloch). I. Oxygen uptake and carbon dioxide release into air and water. *J. Exp. Biol.* **53**:265-280.  
{Keys: CO<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
352. Hughes, G.M. and B.N. Singh. 1970. Respiration in an air-breathing fish, the climbing perch (*Anabas testineus* Bloch). II. Respiratory patterns and the control of breathing. *J. Exp. Biol.* **53**:281-298.  
{Keys: CO<sub>2</sub>/ N<sub>2</sub>/ O<sub>2</sub>/ Ventilation}
353. Hughes, G.M. 1972. Morphometrics of fish gills. *Res. Physiol.* **14**:1-25.  
{Keys: Morphology/ Ventilation}
354. Hughes, G.M. 1972. The relationship between cardiac and respiratory rhythms in the dogfish (*Scyliorhinus canicula* L.). *J. Exp. Biol.* **57**:415-434.  
{Keys: Heart/ Ventilation}
355. Hughes, G.M. and I.E. Gray. 1972. Dimensions and ultrastructure of toadfish gills. *Biol. Bull.* **143**:150-161.  
{Keys: Morphology/ Ventilation}

356. Hughes, G.M. and E.R. Wiebel. 1972. Similarity of supporting tissue in fish gills and the mammalian reticuloendothelium. *J. Ultrastruct. Res.* **39**:106-114.  
{Keys: Morphology/ Ventilation}
357. Hughes, G.M. 1973. Respiratory responses to hypoxia in fish. *Am. Zool.* **13**:475-489.  
{Keys: Heart frequency (fh)/ Hypoxia/ O<sub>2</sub>/ Ventilation frequency (fv)}
358. Hughes, G.M. and M. Morgan. 1973. The structure of fish gills in relation to their respiratory function. *Biol. Rev.* **48**:419-475.  
{Keys: Cough/ Morphology/ Ventilation}
359. Hughes, G.M. 1975. Coughing in the rainbow trout (*Salmo gairdneri*) and the influence of pollutants. *Rev. Suisse Zool.* **82**:47-64.  
{Keys: Cough/ Electromyogram (EMG)/ Kaolin/ Metal/ Pressure/ Suspended solids/ Ventilation/ Zinc (Zn)}
360. Hughes, G.M. 1976. Polluted fish respiratory physiology. In: *Effects of Pollutants on Aquatic Organisms* (A.P.M. Lockwood, ed.). Cambridge University Press, London.  
[Proceedings of Seminar at University of Liverpool (UK). 11 April 1975. Soc. Exp. Biol. Seminar Ser. Vol. 2. pp. 163-183].  
{Keys: Ventilation}
361. Hughes, G.M. and S.F. Perry. 1976. Morphometric study of trout gills: A light microscope method suitable for the evaluation of pollutant action. *J. Exp. Biol.* **64**:447-460.  
{Keys: Morphology/ Ventilation}
362. Hughes, G.M. and R.J. Adeney. 1977. The effects of zinc on the cardiac and ventilatory rhythms of rainbow trout (*Salmo gairdneri* Richardson) and their responses to environmental hypoxia. *Water Res.* **11**:1069-1077.  
{Keys: Cough/ Heart/ Hypoxia/ Metal/ Ventilation/ Zinc (Zn)}
363. Hughes, G.M. and R.J. Adeney. 1977. Variations in the pattern of coughing in rainbow trout. *J. Exp. Biol.* **68**:109-122.  
{Keys: Buccal/ Cough/ Pressure/ Ventilation}
364. Hughes, G.M. 1978. On the respiration of *Torpedo marmorata*. *J. Exp. Biol.* **73**:85-105.  
{Keys: Heart frequency (fh)/ Hypoxia/ Morphology/ Ventilation frequency (fv)/ VO<sub>2</sub>}

365. Hughes, G.M. and J.S. Datta Munshi. 1978. Scanning electron microscopy of the respiratory surfaces of *Saccobranchus (Heteropneustes) fossilis* Bloch. *Cell. Tiss. Res.* **195**(1):99-109.  
{Keys: Morphology/ Ventilation}
366. Hughes, G.M. and R. Flos. 1978. Zinc content of the gills of rainbow trout (*S. gairdneri*) after treatment with zinc solutions under normoxic and hypoxic conditions. *J. Fish Biol.* **13**:717-728.  
{Keys: Metal/ O<sub>2</sub>/ Ventilation/ Zinc (Zn)}
367. Hughes, G.M. and I.A. Johnston. 1978. Some responses of the electric ray (*Torpedo marmoratus*) to low ambient oxygen tensions. *J. Exp. Biol.* **73**:107-117.  
{Keys: Blood/ O<sub>2</sub>/ Ventilation}
368. Hughes, G.M., H. Tuurala and A. Soivio. 1978. Regional distribution of blood in the gills of rainbow trout in normoxia and hypoxia: A morphological metric study with two fixatives. *Ann. Zool. Fennici.* **15**:226-234.  
{Keys: Morphology}
369. Hughes, G.M. and I.A. Johnston. 1979. Histochemistry of some trout respiratory muscles. *Experientia.* **35**(10):1373-1376.
370. Hughes, G.M. 1979. Scanning electron microscopy of the respiratory surfaces of trout gills. *J. Zool. Lond.* **187**:443-453.  
{Keys: Morphology/ Ventilation}
371. Hughes, G.M. and J.S. Datta Munshi. 1979. Fine structure of the gills of some Indian air-breathing fishes. *J. Morphol.* **160**(2):169-194.  
{Keys: Morphology}
372. Hughes, G.M. and K. Nyholm. 1979. Ventilation in rainbow trout (*Salmo gairdneri*, Richardson) with damaged gills. *J. Fish Biol.* **14**:285-288.  
{Keys: Gill damage/ Ventilation}
373. Hughes, G.M., S.F. Perry and V.M. Brown. 1979. A morphological metric study of effects of nickel, chromium and cadmium on the secondary lamellae of rainbow trout gills. *Water Res.* **13**:665-679.  
{Keys: Cadmium (Cd)/ Chromium (Cr)/ Gill damage/ Metal/ Morphology/ Ni/ Ventilation}
374. Hughes, G.M. 1980. Morphometry of fish gas exchange organs in relation to their respiratory function. In: *Environmental Physiology of Fishes* (M.A. Ali, ed.), pp. 33-56. Plenum Press, New York.  
{Keys: Morphology/ Ventilation}

375. Hughes, G.M. 1980. Ultrastructure and morphology of the gills of *Latimeria chalumnae*, and a comparison with the gills of associated fishes. *Proc. R. Soc. Lond. Ser. B.* **208**(1172):309-328.  
{Keys: Morphology}
376. Hughes, G.M., C. Peyraud, M. Peyraud-Waitzenegger and P. Soulier. 1980. Proportion of cardiac output concerned with gas exchange in gills of the eel (*A. anguilla*). *J. Physiol. (Lond.)*. **310**:61-62.  
{Keys: Heart/ Ventilation}
377. Hughes, G.M. 1981. Fish gills - past, present and future. *Biol. Bull. India.* **3**(2):69-87.  
{Keys: Ventilation}
378. Hughes, G.M., M. Horimoto, Y. Kikuchi, Y. Kakiuchi and T. Koyoma. 1981. Blood-flow velocity in microvessels of the gill filaments of the goldfish (*Carassius auratus* L.). *J. Exp. Biol.* **90**:327-331.  
{Keys: Blood/ Ventilation}
379. Hughes, G.M. and S. Thomas. 1981. Effects of hypoxia on the sea bass (*Morone labrax*). *Physiologist.* **24**:129.  
{Keys: Ventilation}
380. Hughes, G.M. and S. Thomas. 1981. Continuous recording of pH, PO<sub>2</sub>, and PCO<sub>2</sub> of arterial blood in sea bass (*Morone labrax*) during changes in environmental PO<sub>2</sub>. *J. Physiol.* **319**:86-87.  
{Keys: Blood/ Ventilation}
381. Hughes, G.M., C. Peyraud, M. Peyraud-Waitzenegger and P. Soulier. 1982. Physiological evidence for the occurrence of pathways shunting blood away from the secondary lamellae of eel gills. *J. Exp. Biol.* **98**:277-288.  
{Keys: Blood/ Ventilation}
382. Hughes, G.M., C. Albers, D. Muster and K.H. Gotz. 1983. Respiration of the carp (*Cyprinus carpio* L) at 10° and 20°C and the effects of hypoxia. *J. Fish Biol.* **22**(5):613-628.  
{Keys: Ventilation}
383. Hughes, G.M. and R.M. Mondolfino. 1983. Scanning electron microscopy of the gills of *Trachurus mediterraneus*. *Experientia.* **39**(5):518-519.  
{Keys: Morphology}

384. Hughes, G.M. and S.I. Umezawa. 1983. Gill structure of the yellowtail and frogfish. *Jpn. J. Ichthyol.* **30**(2):176-183.  
{Keys: Morphology/ *Phrynelox* sp./ *Seriola* sp.}
385. Hughes, G.M. 1984. General anatomy of the gills. In: *Fish Physiology: Gills - Anatomy, Gas Transfer, and Acid-Base Regulation*. Vol. 10, Pt A. (W.S. Hoar and D.J. Randall, eds.), pp. 1-72. Academic Press, New York.  
{Keys: Morphology/ Ventilation}
386. Hughes, G.M. 1984. Measurement of gill area in fishes: Practices and problems. *J. Mar. Biol. Assoc. U.K.* **64**(3):637-655.  
{Keys: Morphology}
387. Hughes, G.M. 1984. Scaling of respiratory areas in relation to oxygen consumption of vertebrates. *Experientia*. **40**(6):519-524.
388. Hughes, G.M. 1984. Respiratory adaptations of marine fish in relation to their mode of life under different environmental conditions. In: *Toxins, Drugs, Pollutants in Marine Mammals* (L. Bolis, J. Zadunaisky and R. Giles, eds.), pp. 98-113. Springer Verlag, Berlin
389. Hughes, G.M. 1985. Citation Classic - The dimensions of fish gills in relation to their function. *C.C. Agr. Biol.* **16** Jan(4):16.  
{Keys: Ventilation}
390. Hughes, G.M. 1985. Comparative studies of respiration as a guide to the selection of bioindicators. *Biological Monitoring of the State of the Environment (Bio-Indicators)*. Indian National Science Academy, New Delhi, pp. 126-141.  
{Keys: Ventilation}
391. Hughes, G.M. and L. Tort. 1985. Cardio-respiratory responses of rainbow trout during recovery from zinc treatment. *Environ. Pollut., Ser. A*. **37**(3):255-266.  
{Keys: Cough frequency (fc)/ EKG/ Heart/ Metal/ *Salmo* sp./ Ventilation frequency (fv)/ Zinc (Zn)}
392. Hughes, G.M. 1986. The use of comparative physiological and biochemical methods in bioindication of the natural environment. In: *Biological Monitoring of the State of the Environment: Bioindicators. An Overview of the IUBS Programme on Bioindicators*. IUBS Monogr. Ser. Vol. 1 (J. Salanki, ed.), pp. 41-56. IRL Press, London.
393. Hughes, G.M. and N.K. Alkadhom. 1986. Gill morphologyometry of the mudskipper, *Boleophthalmus boddarti*. *J. Marine Biol.* **66**(3):671-682.  
{Keys: Morphology}

394. Hughes, G.M., S.F. Perry and J. Piiper. 1986. Morphometry of the gills of the elasmobranch (*Scyliorhinus stellaris*) in relation to body size. *J. Exp. Biol.* **121**:27-42.  
{Keys: Ventilation}
395. Huish, M.T. 1968. *Cardiac and opercular rate responses of (Ictalurus nebulosus LeSueur) to representatives of certain drug groups*. Ph.D. Thesis, University of Georgia. 271 pp.  
{Keys: Anesthetic/ Heart/ MS<sub>222</sub>/ Ventilation}
396. Huner, J.V., B.F. Dowden and H.J. Bennet. 1967. The effects of endrin on the oxygen consumption of the bluegill sunfish (*Lepomis macrochirus*). *Proc. La. Acad. Sci.* **30**:80-86.  
{Keys: Pesticides/ Ventilation/ VO<sub>2</sub>}
397. Hutchins, F.F. 1979. Toxicity of pulp and paper mill effluent: A literature review. *USEPA Ecol. Res. Series EPA-600 3-79-013*. USEPA, Corvallis (OR). 50 pp.  
{Keys: Cough/ Growth/ LC<sub>50</sub>/ Review/ Temperature/ Ventilation}
398. Hyde, K.M., J.C. Crandall, K.E. Kortman and W.K. McCoy. 1978. EEG, ECG and respiratory response to acute insecticide exposure. *Bull. Environ. Contam. Toxicol.* **19**:47-55.
399. Ibaragi, T. 1970. Electrocardiograms and their telemetry as physiological information on rainbow trout. *Bull. Mar. Biotelemetry Res. Gr.* **3**:12-19. [Japanese]. Translation: Fisheries Research Board of Canada. Translation Series No. 1956. 1972. 21 pp.  
{Keys: Heart/ Ventilation}
400. Innes, A.J. and R.M.G. Wells. 1985. Respiration and oxygen transport functions of the blood from an intertidal fish (*Helcogramma medium* Tripteryglidae). *Environ. Biol. Fishes.* **14**(2/ 3):213-226.  
{Keys: Blood/ PO<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
401. Itazawa, Y. 1970. Heart rate, cardiac output and circulation time of fish. *Bull. Jpn. Soc. Sci. Fish.* **36**:926-931.  
{Keys: Blood/ Heart/ Ventilation}
402. Itazawa, Y. and T. Takeda. 1978. Gas exchange in the carp gills in normoxic and hypoxic conditions. *Respir. Physiol.* **35**:263-69.  
{Keys: Blood/ *Carassius sp.*/ Carp/ Hypoxia/ PaO<sub>2</sub>/ Ventilation}

403. Itazawa, Y. and T. Takeda. 1979. An estimation of the minimum level of dissolved oxygen in water required for normal life of fish--II. An experiment with carp under carbon dioxide accumulation. *Bull. Jpn. Soc. Sci. Fish.* **45**(2):323-327.  
{Keys: CO<sub>2</sub>/ O<sub>2</sub>/ PO<sub>2</sub>/ Ventilation}
404. Itazawa, Y. and T. Takeda. 1982. Respiration of carp under anesthesia induced by mixed bubbling of carbon dioxide and oxygen. *Bull. Jpn. Soc. Sci. Fish.* **48**(4):489-493.  
{Keys: Anesthetic/ Blood/ CO<sub>2</sub>/ *Cyprinus* sp./ O<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
405. Iwata, K.S., M. Watanabe and H. Matsuoka. 1969. Rhythmic potentials recorded in the water surrounding the eel. *Jpn. Zool. Mag.* **78**:117-119.  
{Keys: Ventilation}
406. James, R. 1990. Individual and combined effects of heavy metals on behaviour and respiratory responses of *Oreochromis mossambicus*. *Indian J. Fish.* **37**(2):139-143.  
{Keys: Behavior/ Cadmium (Cd)/ Copper (Cu)/ Metal/ Mixtures/ Ventilation frequency (fv)/ VO<sub>2</sub>/ Zinc (Zn)}
407. Janssen, R.G. and D.J. Randall. 1975. The effects of changes in pH and PCO<sub>2</sub> in blood and water on breathing in rainbow trout (*Salmo gairdneri*). *Respir. Physiol.* **25**:235-245.  
{Keys: Ventilation}
408. Jia, X.X. and W.W. Burggren. 1997. Developmental changes in chemoreceptive control of gill ventilation in larval bullfrogs (*Rana catesbeiana*). 1. Reflex ventilatory responses to ambient hyperoxia, hypoxia and NaCN. *J. Exp. Biol.* **200**(16):2229-2236.  
{Keys: Frog/ Ventilation}
409. Jia, X.X. and W.W. Burggren. 1997. Developmental changes in chemoreceptive control of gill ventilation in larval bullfrogs (*Rana catesbeiana*). 2. Sites of O<sub>2</sub> sensitive chemoreceptors. *J. Exp. Biol.* **200**(16):2237-2248.  
{Keys: Frog/ Ventilation}
410. Johansen, K. 1966. Air breathing in the teleost (*Symbranchus marmoratus*). *Comp. Biochem. Physiol.* **18A**:383-395.  
{Keys: Air breathing/ Blood/ Heart/ PaO<sub>2</sub>/ PCO<sub>2</sub>/ Ventilation}
411. Johansen, K. 1970. Air breathing in fish. In: *Fish Physiology*. Vol IV (W.S. Hoar and D.J. Randall, eds.), pp. 361-413. Academic Press, New York.  
{Keys: Air breathing/ Review/ Ventilation}

412. Johansen, K. 1971. Comparative physiology: Gas exchange and circulation in fishes. *Annu. Rev. Physiol.* **33**:569-612.  
{Keys: Blood/ Ventilation}
413. Johnston, I.A., L.M. Bernard and G.M. Maloy. 1983. Aquatic and aerial respiration rates, muscle capillary supply and mitochondrial volume density in the air-breathing catfish (*Clarias mossambicus*) acclimated to either aerated or hypoxic water. *J. Exp. Biol.* **105**:317-338.  
{Keys: Air breathing/ Blood/ Hypoxia/ PO<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}
414. Johnston, N.A.L., V.S. Campagna, P.R. Hawkins and R.J. Banens. 1994. Response of the eastern rainbowfish (*Melanotaenia duboulayi*) to toxic *Microcystis aeruginosa*. *Australian J. Mar. Freshwater Res.* **45**(5):917-923.  
{Keys: Ventilation}
415. Johnstone, A.D.F. and A.D. Hawkins. 1980. Changes in the respiration and blood circulation of cod (*Gadus morhua* L), induced by exposure to pollutants. *Scott. Fish. Res. Rep. No. 18*. Department of Ag. and Fisheries for Scotland, Aberdeen (UK). 40 pp.  
{Keys: Cough/ Cryolite/ Effluent/ Heart/ Oil/ Ventilation/ VO<sub>2</sub>}
416. Johnstone, A.D.F. and A.D. Hawkins. 1980. Changes in the respiration and blood circulation of cod (*Gadus morhua* L), induced by exposure to pollutants. *ICES-CM--1980 E:46. ICES Council Meeting 1980 (Collected Papers)*. International Council for Exploration of the Sea, Copenhagen (Denmark). 20 pp.  
{Keys: Cough/ Cryolite/ Effluent/ Heart/ Oil/ Ventilation/ VO<sub>2</sub>}
417. Johnstone, A.D.F., D. Whitford and A.D. Hawkins. 1982. The effects of an industrial waste (Cryolite recovery sludge) upon the Atlantic salmon (*Salmo salar* L). Detection thresholds and the effects of exposure to the waste upon detection of an amino acid. *Water Res.* **16**(11):1529-1535.  
{Keys: Cough/ Cryolite/ Effluent/ Glycine/ Heart/ Seawater/ Ventilation/ VO<sub>2</sub>}
418. Jones, J.R.E. 1935. The toxic action of heavy metal salts on the three-spined stickleback (*Gasterosteus aculeatus*). *J. Exp. Biol.* **12**:165-173.  
{Keys: Ventilation}
419. Jones, J.R.E. 1938. The relative toxicity of salts of lead, zinc and copper to the stickleback (*Gasterosteus aculeatus* L) and the effect of calcium on the toxicity of lead and zinc salts. *J. Exp. Biol.* **15**(3):394-407.  
{Keys: Calcium (Ca)/ Copper (Cu)/ Lead (Pb)/ Metal/ Ventilation/ Zinc (Zn)}

420. Jones, J.R.E. 1947. The oxygen consumption of *Gasterosteus aculeatus* in toxic solutions. *J. Exp. Biol.* **23**:298-311.  
{Keys: Anesthetic/ Chloroform/ Copper (Cu)/ Cyanide/ Lead (Pb)/ Mercury (Hg)/ Metal/ Sulfide/ Ventilation/ VO<sub>2</sub>}
421. Jones, J.R.E. 1952. The reaction of fish to water of low oxygen concentration. *J. Exp. Biol.* **29**:403-415.  
{Keys: Hypoxia/ O<sub>2</sub>/ Ventilation}
422. Jouve, A. and J.P. Truchot. 1978. Influence of the water oxygen on oxygen consumption and breathing rate of the crab (*Carcinus maenas* L.). *C.R. Acad. Sc. Paris.* **286**:331-334. [French].  
{Keys: Invertebrate/ Ventilation/ VO<sub>2</sub>}
423. Jüch, P.J.W. 1981. Mechanoreceptive signals processed by mesencephalic trigeminal neurons in the carp. *J. Comp. Physiol.* **141**:157-162.  
{Keys: Brain/ *Cyprinus sp.*/ Nervous system/ Ventilation}
424. Jüch, P.J.W. 1981. Anatomy of respiratory rhythmic systems in brain stem and cerebellum of the carp. *Brain Res.* **230**(1-2):51-64.  
{Keys: Brain/ *Cyprinus sp.*/ Nervous system/ Ventilation}
425. Jüch, P.J.W. 1982. Do the extraocular muscles in the carp compensate for eye displacements induced by respiratory movements? *J. Exp. Biol.* **99**:363-368.  
{Keys: Brain/ Cough/ *Cyprinus sp.*/ Electromyogram (EMG)/ Nervous system/ Ventilation/ Video}
426. Jüch, P.J.W. and C.M. Ballintijn. 1983. Tegmental neurons controlling medullary respiratory center activity in the carp. *Respir. Physiol.* **51**(1):95-107.  
{Keys: Brain/ *Cyprinus sp.*/ Horse radish peroxidase (HRP)/ Nervous system/ Ventilation}
427. Jung, K.D. 1973. Substances extremely toxic to fish and their importance for a fish test warning system. [Extrem fischtoxische substanzen und ihre Bedeutung für ein Fischtest-warnsystem]. *GWF-Wasser Abwasser.* **114**(5):232-233.  
{Keys: Ventilation}
428. Kaiser, K.L.E., M.B. McKinnon, D.H. Stendahl and W.B. Pett. 1995. Response threshold levels of selected organic compounds for rainbow trout (*Oncorhynchus mykiss*). *Environ. Toxicol. Chem.* **14**(12):2107-2113.  
{Keys: Activity/ Phenol/ Swimming/ Ventilation frequency (fv)}

429. Kalmijn, A.J. and K.J. Rose. 1978. The shark's sixth sense. *Nat. Hist Mag.* **87**(3):76-81.  
{Keys: Brain/ Nervous system/ Shark/ Ventilation}
430. Kapoor, N.N. 1971. A recording device for measuring respiratory movements of aquatic insects. *Proc. Entomol. Soc. Ont.* **102**:71-78.  
{Keys: Invertebrate/ Ventilation}
431. Karpovich, T.A. and B.I. Korlupayev. 1981. The rate of respiratory movements and the heart contractions in the black Baikal grayling (*Thymallus arcticus baicalensis* Dyb) under changes in environmental factors. *Vopr. Ikhtiol.* **21**(3):520-524. [*Aq. Sci. Fish. Abstr.* 1982, **12**(7):8281.].  
{Keys: O<sub>2</sub>/ Temperature/ Ventilation}
432. Karpovich, T.A. and B.I. Korlupayev. 1981. Rate of breathing movements and heart contractions in the Baikal grayling (*Thymallus arcticus baicalensis*) during changes in environmental factors. *J. Ichthyol.* **21**(3):85-89.  
{Keys: O<sub>2</sub>/ Temperature/ Ventilation}
433. Kawasaki, R. 1984. Breathing rhythm-generation mechanism in the adult lamprey (*Lampetra japonica*). *Jpn. J. Physiol.* **34**(2):319-335.  
{Keys: Brain/ Nervous system/ Ventilation}
434. Kerstens, A., J.P. Lomholt and K. Johansen. 1979. The ventilation, extraction and uptake of oxygen in undisturbed flounders (*Platichthys flesus*): Responses to hypoxia acclimation. *J. Exp. Biol.* **83**:169-179.  
{Keys: Flounder/ O<sub>2</sub>/ *Platichthys* sp. / Ventilation volume (VG)/ VO<sub>2</sub>}
435. Kesler, D.H. 1972. Measurement of the ventilation rate of the swordtail (*Xiphophorus helleri*) as influenced by copper. *J. Sci. Lab., Denison Univ.* **53**:51-61.  
{Keys: Behavior/ Feed/ Metal/ Ventilation}
436. Keys, A.B. and N.A. Wells. 1930. Amytal anesthesia in fishes. *J. Pharmacol. Exp. Ther.* **40**:115-128.  
{Keys: Anesthetic/ Ventilation/ VO<sub>2</sub>}
437. Kiceniuk, J.W., W.R. Penrose and W.R. Squires. 1978. Oil spill dispersants cause bradycardia in a marine fish. *Mar. Pollut. Bull.* **9**(2):42-45.  
{Keys: Detergent/ Heart/ Mode of action/ Ventilation volume (VG)}
438. Kingsbury, R.W.S.M. and C.P. Rees. 1978. Rapid biological methods for continuous water quality monitoring. *Effluent Water Treat. J.* **July**:319-331.  
{Keys: Ventilation}

439. Kinkead, R. and S.F. Perry. 1990. An investigation of the role of circulating catecholamines in the control of ventilation during acute moderate hypoxia in rainbow trout (*Oncorhynchus mykiss*). *J. Comp. Physiol.* **160B**(4):441-448.  
{Keys: Blood/ PaO<sub>2</sub>/ Ventilation frequency (fv)/ Ventilation volume (VG)}
440. Kinkead, R., R. Fritsche, S.F. Perry and S. Nilsson. 1991. The role of circulating catecholamines in the ventilatory and hypertensive responses to hypoxia in the Atlantic cod (*Gadus morhua*). *Physiol. Zool.* **64**(4):1087-1109.  
{Keys: Blood pressure/ Catechol/ PO<sub>2</sub>/ Ventilation}
441. Kinnamon, S.C., A.E. Kamer and A.L. Kiorpis. 1984. Control of ventilatory movements in the aquatic insect (*Corydalus cornutus*): Central effect of hypoxia. *Physiol. Entomol.* **9**(1):19-28.  
{Keys: Invertebrate/ Ventilation}
442. Klaverkamp, J.F., M. Duangswasdi, W.A. Macdonald and H.S. Majewski. 1977. An evaluation of fenitrothion toxicity on four life stages of rainbow trout (*Salmo gairdneri*). In: *Aquatic Toxicology and Hazard Evaluation. Proceedings of the First Annual Symposium on Aquatic Toxicology. ASTM STP 634* (F.L. Mayer and J.L. Hamelink, ed.), pp. 231-240. American Society for Testing and Materials, Philadelphia.  
{Keys: AChE/ Cough/ Fenitrothion/ Heart/ Organophosphorus/ Pesticides/ Ventilation}
443. Klaverkamp, J.F. 1982. The physiological pharmacology and toxicology of fish cardiovascular systems. In: *Aquatic Toxicology. Volume 1* (L.J. Weber, ed.), pp. 1-54. Raven Press, New York.  
{Keys: Ventilation}
444. Kleerekoper, H. and K. Sibakin. 1956. An investigation of the electrical "spike" potentials produced by the sea lamprey (*Petromyzon marinus*) in the water surrounding the head region. *J. Fish. Res. Board Can.* **13**(3):375-383.  
{Keys: Ventilation}
445. Klinger, S.A., J.J. Magnuson and G.W. Gallepp. 1982. Survival mechanisms of the central mudminnow (*Umbra limi*), fathead minnow (*Pimephales promelas*) and brook stickleback (*Culaea inconstans*) for low oxygen in winter. *Environ. Biol. Fishes.* **7**(2):113-120.  
{Keys: Fathead minnow/ Metabolism/ O<sub>2</sub>/ Ventilation}
446. Klock, J.W. and E.A. Pearson. 1961. *Engineering and development of bioassay kinetics. Final Report No. 12-15*. The State Water Pollution Control Board, State of California. 160 pp.  
{Keys: Ventilation}

447. Klontz, G.W. 1964. Anesthesia of fishes. In: *Proceedings of the Symposium on Experimental Animal Anesthesiology*. 14-16 December. pp. 350-363. Brooks Air Force Base (TX).  
{Keys: Anesthetic}
448. Klyashtorin, L.B. 1978. Concept of dependent and independent respiration in fish and other marine animals. [O kontseptsii zavisimogo i nezavisimogo dykhaniya ryb i drygikh vodnykh zhivotnykh]. *Zhurnal Obshchey Biologii*. **39**(2):207-211.  
[Russian]. Translation: TR-78-0501. SCITRAN (Scientific Translation Service), Santa Barbara (CA). 9 pp.  
{Keys: Ventilation}
449. Klyashtorin, L.B. and B.P. Smirnov. 1984. On the energy cost of gill ventilation in fish. [Ob otsenke ehnergeticheskikh zatrata na dykhanie ryb]. In: *Physiological Basis of Reproduction of Marine and Anadromous Fishes* [Fiziologicheskie Osnovy Vosproizvodstva Morskikh I Prrokhodnykh Ryb]. pp. 76-81. Legkaya i Pischevaya Promyshlennost, Moskva (USSR). Sb. Nauchn. Tr. VNIRO. (Aq. Sci. Fish. Abstr. **14**(3):8123).  
{Keys: Hypoxia/ Metabolism/ Ventilation/ VO<sub>2</sub>}
450. Koeman, J.H., C.L.M. Poels and W. Slooff. 1978. Continuous biomonitoring systems for detection of toxic levels of water pollutants. In: *Aquatic Pollutants: Transformation and Biological Effects* (O. Hutzinger, I.H. van Lelyveld and B.C.J. Zoeteman, eds.), pp. 339-347. Pergamon Press, Oxford.  
{Keys: Ventilation}
451. Konishi, J. 1957. A clue to the investigation of the control of breathing in fish by means of electrical activity in the muscle located on the regions of the gills. *Report of the Faculty of Fisheries, Prefectural Univ. Of Mie.* **2**(3):347-352.  
{Keys: *Carassius* sp./ Electromyogram (EMG)/ Ventilation}
452. Konishi, J. 1957. Respiratory reflex response in fish. *Report of the Faculty of Fisheries, Prefectural Univ. Of Mie.* **2**(3):353-358.  
{Keys: *Carassius* sp./ Cough/ Electromyogram (EMG)/ Goldfish/ Ventilation}
453. Konishi, J., I. Hidaka, M. Toyota and H. Matsuda. 1969. High sensitivity of the palatal chemoreceptors of the carp to carbon dioxide. *Jpn. J. Physiol.* **19**:327-341.  
{Keys: CO<sub>2</sub>/ HCl/ N<sub>2</sub>/ O<sub>2</sub>/ Ventilation}
454. Koundinya, P.R. and R. Ramamurthi. 1980. Toxicity of sumithion and Sevin to the freshwater fish (*Sarotherodon mossambicus* Peters). *Current Sci.* **49**(22):875-876.  
{Keys: AChE/ Carbaryl (Sevin)/ LC<sub>50</sub>/ Pesticides/ Ventilation}

455. Kramer, D.L. and J.P. Mehegan. 1981. Aquatic surface respiration, an adaptive response to hypoxia in the guppy (*Poecilia reticulata* Pisces, Poeciliidae). *Environ. Biol. Fishes* **6**(3-4):299-313.  
 {Keys: Hypoxia/ PO<sub>2</sub>/ Ventilation}
456. Kramer, D.L. 1983. The evolutionary ecology of respiratory mode in fishes--An analysis based on the costs of breathing. *Environ. Biol. Fishes* **9**(2):145-158.  
 {Keys: Ventilation}
457. Kramer, D.L. 1987. Dissolved oxygen and fish behavior. *Environ. Biol. Fishes* **18**(2):81-92.  
 {Keys: Air breathing/ Locomotion/ O<sub>2</sub>/ Review/ Ventilation}
458. Kuiper, T. 1907. Untersuchungen über die atmung der teleostei. *Pflug. Arch. Gesamte Physiol. Menschen Tiere* **177**:1-107.  
 {Keys: Ventilation}
459. Kulakkattolickal, A.T. and D.L. Kramer. 1987. Effect of surface access and oxygen concentration on the toxicity of (*Croton tiglium* Euphorbiaceae) seed extract to (*Branchydanio rerio* Cyprinidae). *Can. J. Fish. Aquat. Sci.* **44**(7):1358-1361.  
 {Keys: Air breathing/ Hypoxia/ O<sub>2</sub> / Ventilation}
460. Kulakkattolickal, A.T. and D.L. Kramer. 1988. The role of air breathing in the resistance of bimodally respiring fish to waterborne toxins. *J. Fish Biol.* **32**(1):119-127.  
 {Keys: Air breathing/ Catfish/ *Clarias sp.*/ Hypoxia/ Ventilation frequency (fv)}
461. Kumar, A. 1994. Toxicity and behavioural responses of (*Heteropneustes fossilis* Bloch) to copper sulphate. *J. Aquat. Biol. Fish.* **1**(1):15-18.  
 {Keys: Copper (Cu)/ Metal/ Rheotaxic/ Ventilation}
462. Labat, R., G. Dazarola and A. Chatelet. 1973. Principle of a technical device for the study of toxic effluents in water pollution. *Bull. Soc. Hist. Nat. Toulouse.* **109**(1/2):163-170. [French].  
 {Keys: Carp/ *Cyprinus sp.*/ Heart/ *Perca sp.*/ *Tinca sp.*/ Ventilation}
463. Lacroix, G.L. and D.R. Townsend. 1987. Responses of juvenile Atlantic salmon (*Salmo salar*) to episodic increases in acidity of Nova Scotia rivers. *Can. J. Fish. Aquat. Sci.* **44**(8):1475-1484.  
 {Keys: Acid/ Blood/ Cough/ Cough frequency (fc)/ pH}

464. Lai, H., V. Misra, P.N. Viswanathan and C.R.K. Murti. 1984. Effect of synthetic detergents on some of the behavioral patterns of fish fingerlings (*Cirrhinus mrigala*) and its relation to ecotoxicology. *Bull. Environ. Contam. Toxicol.* **32**(1):109-115.  
{Keys: Behavior/ O<sub>2</sub>/ School/ Ventilation}
465. Laitinen, M. and T. Valtonen. 1995. Cardiovascular, ventilatory and haematological responses of brown trout (*Salmo trutta*, L), to the combined effects of acidity and aluminum in humic water at winter temperatures. *Aquat. Toxicol.* **31**(2):99-112.  
{Keys: Acid/ Aluminum (Al)/ Blood/ External electrodes/ Heart frequency(fh)/ Metal/ pH/ Ventilation frequency (fv)}
466. Laitinen, M., R. Siddal and T. Valtonen. 1996. Bioelectronic monitoring of parasite-induced stress in brown trout and roach. *J. Fish Biol.* **48**(2):228-241.  
{Keys: Activity/ External electrodes/ Heart/ *Rutilus sp.*/ *Salmo sp.*/ Swimming/ Ventilation frequency (fv)}
467. Laming, P.R. and G. Savage. 1981. Seasonal differences in brain activity and responsiveness shown by the goldfish (*Carassius auratus*). *Behav. Neural Biol.* **32**(3):386-389.  
{Keys: EEG/ EKG/ Heart/ Ventilation}
468. Laming, P.R. 1983. Ventilatory rate in the butterfish (*Pholis gunnellus*) as a consequence of temperature and previous immersion. *Comp. Biochem. Physiol.* **76A**(1):71-73.  
{Keys: Temperature/ Ventilation}
469. Laming, P.R. and S.J. McKinney. 1990. Habituation in goldfish (*Carassius auratus*) is impaired by increased interstimulus interval, interval variability, and telencephalic ablation. *Behav. Neurosci.* **104**(6):869-875.  
{Keys: Brain/ EKG/ Heart/ Light/ Ventilation}
470. Lang, T., G. Peters, R. Hoffmann and E. Meyer. 1987. Experimental investigations on the toxicity of ammonia: Effects on ventilation frequency, growth, epidermal mucous cells, and gill structure of rainbow trout (*Salmo gairdneri*). *Dis. Aquat. Org.* **3**(3):159-165.  
{Keys: Ammonia/ Feed/ Gill damage/ Ventilation frequency (fv)}
471. Lauder, G.V. Jr. 1980. The suction feeding mechanism in sunfishes (*Lepomis*): An experimental analysis. *J. Exp. Biol.* **88**:49-72.  
{Keys: Buccal/ Feed/ Pressure/ Ventilation}

472. Lauder, G.V. Jr. and L.E. Lanyon. 1980. Functional anatomy of feeding in the bluegill sunfish (*Lepomis macrochirus*): *In vivo* measurement of bone strain. *J. Exp. Biol.* **84**:33-55.  
 {Keys: Buccal/ Cough/ Electromyogram (EMG)/ Feed/ Pressure/ Ventilation}
473. Lauder, G.V. Jr. 1984. Pressure and water flow patterns in the respiratory tract of the bass (*Micropterus salmoides*). *J. Exp. Biol.* **113**:151-164.  
 {Keys: Buccal/ Pressure/ Ventilation}
474. Laurent, P. and J.D. Rouzeau. 1973. Comparative physiology of breathing rates in regulating PCO<sub>2</sub>. [Physiologie comparee des regulations. - Relationsentre les valeurs de PaO<sub>2</sub> et de PwO<sub>2</sub>, chez Ictalurus melas: influence de ces parametres dans la regulation ventilatoire]. *C.R. Acad. Sc. Pari. Series D.* **277**:1901-1904. [French].  
 {Keys: Ventilation}
475. Lawrence, V., R.E. Young and A. Mansingh. 1986. The effect of sub-lethal doses of dieldrin on the ventilatory and cardiac activity in two species of shrimp. *Comp. Biochem. Physiol.* **85C**(1):177-181.  
 {Keys: Cyclodiene/ Heart frequency (fh)/ *Macrobrachium* sp./ Ventilation frequency (fv)}
476. Lee, E.L. and J.C. Buzzell Jr. 1969. Measurement of pesticide toxicity by fish respiration rate. *Engineering Extension Series No. 135*. pp. 595-609. Presented at the Proceedings of the 24th Industrial Waste Conference. 6-8 May 1969. Purdue University, Lafayette (IN).  
 {Keys: Pesticides/ Ventilation}
477. Leiner, M. 1938. *Die Physiologie der Fischatmung*. Akademische Verlagsgesellschaft. M.B.H., Leipzig. 134 pp.
478. Lemons, D.E. and L.I. Crawshaw. 1985. Responses to rapid temperature change in the Pacific lamprey (*Lampetra tridentata*). *Can. J. Zool.* **63**(5):1027-1032.  
 {Keys: Heart frequency (fh)/ Temperature/ Ventilation frequency (fv)}
479. Lewis, S.V. 1976. *Respiration and gill morphology of the paired species of lampreys (Lampetra fluviatilis L) and (Lampetra planari Bloch)*. Ph.D. Thesis. Bath University (UK).125 pp.  
 {Keys: Ventilation}
480. Lewis, S.V. 1980. Respiration of lampreys. *Can. J. Fish. Aquat. Sci.* **37**(11):1711-1722.  
 {Keys: Heart/ Hypoxia/ Ventilation/ VO<sub>2</sub>}

481. Liem, K.F., J.W. Wallace and G. Whalen. 1985. Flatfishes breathe symmetrically: An experimental reappraisal. *Exp. Biology*. **44**(3):159-172.
482. Lindahl, P.E. and C.E.B. Hell. 1970. Effects of short-term exposure of (*Leuciscus rutilus* L Pisces) to phenylmercuric hydroxide. *Oikos*. **21**:267-275.  
{Keys: Blood/ Mercury (Hg)/ Metal/ O<sub>2</sub>/ Roach/ Ventilation}
483. Lindahl, P.E. and K.E. Oberg. 1961. The effect of rotenone on respiration and its point of attack. *Exp. Cell Res.* **23**:228-237.  
{Keys: Ventilation}
484. Lingaraja, T. and V.K. Venugopalan. 1978. Pesticide induced physiological and behavior changes in an estuarine teleost (*Therapon jarbua* Forsk). *Fish Technol. (Soc. Fish. Technol., Cochin)*. **15**(2):115-119.  
{Keys: AChE/ Activity/ Carbaryl (Sevin)/ DDT/ Dimethoate/ Pesticides/ Ventilation}
485. Little, E.E., J.F. Fairchild and A.J. DeLonay. 1993. Behavioral methods for assessing impacts of contaminants on early life stage fishes. In: *Water Quality and the Early Life Stages of Fishes, American Fisheries Society Symposium, Vol. 14* (L.A. Fuiman, ed.), pp. 67-76. American Fisheries Society, Bethesda (MD).  
{Keys: Activity/ Feed/ Predator/ Review/ Swimming/ Ventilation}
486. Lloyd, R. and D.H.M. Jordan. 1964. Some factors affecting the resistance of rainbow trout (*Salmo gairdneri* Richardson) to acid waters. *Int. J. Air Wat. Pollut.* **8**:393-403.  
{Keys: Ventilation}
487. Lloyd, R. and D.J. Swift. 1976. Some physiological responses by freshwater fish to low dissolved oxygen, high carbon dioxide, ammonia and phenol with particular reference to water balance. In: *Effects of Pollutants on Aquatic Organisms* (A.P. Lockwood, ed.), pp. 47-69. Cambridge University Press, Cambridge.  
{Keys: Ventilation}
488. Lochowitz, R.T., H.M. Miles and D.R. Hafemann. 1974. Anesthetic-induced variations in the cardiac rate of the teleost (*Salmo gairdneri*). *Comp. Gen. Pharmacol.* **5**:217-224.  
{Keys: Anesthetic/ Heart/ Ventilation}
489. Locke, D.O. 1969. Quinaldine as an anesthetic for brook trout, lake trout, and Atlantic salmon. *Investigations in Fish Control: 24*. Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, Washington (D.C.). 5 pp.  
{Keys: Temperature/ Ventilation}

490. Lomholt, J.P. and K. Johansen. 1979. Hypoxia acclimation in carp - How it affects O<sub>2</sub> uptake, ventilation, and O<sub>2</sub> extraction from water. *Physiol. Zool.* **52**(1):38-49.  
{Keys: Uptake efficiency (UE)/ Ventilation/ VO<sub>2</sub>}
491. Lonsdale, E.M. and W.C. Marshall. 1973. Noncontact sensing of electric fields surrounding trout. *ISA Trans.* **12**:82-87.  
{Keys: Heart/ Telemetry/ Ventilation}
492. Luke, D.M., D.G. Pincock, P.D. Sayre and A.H. Weatherly. 1979. A system for the telemetry of activity-related information from free swimming fish. In: *Proceedings. Second International Conference on Wildlife Telemetry* (F.M. Long, ed.), pp. 77-85. International Conference on Wildlife Telemetry, Univ. Wyoming, Laramie (Wyoming).  
{Keys: Ventilation}
493. Lunn, C.R., D.P. Toews and D.J. Pree. 1976. Effects of three pesticides on respiration, coughing, and heart rates of rainbow trout (*Salmo gairdneri*). *Can. J. Zool.* **54**:214-219.  
{Keys: AChE/ Carbaryl (Sevin)/ Cough/ Cyclodiene/ DDT/ Dieldrin/ HEOD/ Pesticides/ Ventilation}
494. Lutcavage, M.E. and P.L. Lutz. 1991. Voluntary diving metabolism and ventilation in the loggerhead sea turtle. *J. Exp. Mar. Biol. Ecol.* **147**(2):287-296.  
{Keys: *Caretta sp.*/ PaO<sub>2</sub>/ Ventilation}
495. Lutz, B.R. 1930. Reflex cardiac and respiratory inhibition in the elasmobranch (*Scyllium canicula*). *Biol. Bull.* **59**:170-178.  
{Keys: Heart/ Ventilation}
496. Lutz, B.R. 1930. Respiratory rhythm in the elasmobranch (*Scyllium canicula*). *Biol. Bull.* **59**:179-186.  
{Keys: Ventilation}
497. Lyon, E.P. 1926. A study of the circulation, blood pressure and respiration of sharks. *J. Gen. Physiol.* **8**:279-290.  
{Keys: Heart/ Ventilation}
498. MacLeod, J.C. and L.L. Smith Jr. 1966. Effect of pulpwood fiber on oxygen consumption and swimming endurance of the fathead minnow (*Pimephales promelas*). *Trans. Am. Fish. Soc.* **95**(1):71-84.  
{Keys: Blood/ Cough/ Fathead minnow/ Metabolism/ O<sub>2</sub>/ Suspended solids/ Swimming/ Temperature/ Ventilation/ VO<sub>2</sub>}

499. Majewski, H.S. and J.F. Klaverkamp. 1975. An acute bioassay for cardiovascular and respiratory functions in rainbow trout. In: *Second Annual Aquatic Toxicity Workshop, Proceedings* (G.R. Craig, ed.), pp. 165-178. The Ontario Ministry of the Environment, Toronto.  
{Keys: Heart/ Ventilation}
500. Majewski, H.S., J.F. Klaverkamp and D.P. Scott. 1978. Acute lethality, and sublethal effects of acetone, ethanol, and propylene glycol on the cardiovascular and respiratory systems of rainbow trout (*Salmo gairdneri*). *Water Res.* **13**:217-221.  
{Keys: Buccal/ Heart frequency (fh)/ LC<sub>50</sub>/ Pressure/ Ventilation frequency (fv)}
501. Majewski, H.S., J.F. Klaverkamp and M.A. Giles. 1979. Testing effects on cardiovascular respiratory functions in fish. In: *Toxicity Tests for Freshwater Organisms. Can. Special Publication of Fisheries and Aquatic Sciences No. 44.* (E. Scherer, ed.), pp. 139-149.  
{Keys: Heart/ Ventilation}
502. Majewski, H.S. and M.A. Giles. 1981. Cardiovascular-respiratory responses of rainbow trout (*Salmo gairdneri*) during chronic exposure to sublethal concentrations of cadmium. *Water Res.* **15**:1211-1217.  
{Keys: Blood/ Cadmium (Cd)/ Heart frequency (fh)/ Metal/ Ventilation frequency (fv)}
503. Maki, A.W., K.S. Stewart and J.K.G. Silvey. 1973. The effects of dibrom on respiratory activity of the stonefly (*Hydropsyche crosbyi*) hellgrammite (*Corydalus cornutus*) and the golden shiner (*Notemigonus crysoleucas*). *Trans. Am. Fish. Soc.* **102**:806-815.  
{Keys: Golden shiner/ Hellgrammite/ Respiration/ Stonefly/ Ventilation}}
504. Maki, A.W. 1979. Respiratory activity of fish as a predictor of chronic fish toxicity values for surfactants. In: *Aquatic Toxicology. Proceedings of the 2d Annual Symposium on Aquatic Toxicology. ASTM STP 667* (L.L. Marking and R.A. Kimerle, eds.), pp. 77-95. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Bluegill/ Electromyogram (EMG)/ *Lepomis* sp./ Ventilation frequency (fv)}
505. Maki, A. W. 1979. Monitoring aberrant respiratory activity of bluegill as a predictor of chronic fish toxicity values of surfactants. In: *Aquatic Toxicology. ASTM STP 667* (L.L. Marking and R.S. Kimerle, eds.), pp. 171-185 American Society for Testing and Materials, Philadelphia(PA). (Publication No. 04-667000-16. 403 pp.).  
{Keys: Ventilation frequency (fv)}}

506. Maki, A.W. 1980. Industrial applications of biological monitoring in the laboratory and field. In: *Biological Monitoring for Environmental Effects* (D.L. Worf, ed.), pp. 75-92. Lexington Books, D.C. Heath and Company, Lexington (Mass).  
{Keys: Ventilation}
507. Mallatt, J. and C. Stinson. 1990. Toxicant extraction efficiency and branchial NaCl fluxes in lampreys exposed to kepone. *Arch. Environ. Contam. Toxicol.* **19**(3):307-313.  
{Keys: Organochlor/ Pesticides/ Uptake efficiency (UE)/ Ventilation frequency (fv)}
508. Malte, H. 1986. Effects of aluminum in hard, acid water on metabolic rate, blood gas tensions and ionic status in the rainbow trout. *J. Fish Biol.* **29**(2):187-198.  
{Keys: Aluminum (Al)/ Blood/ Metabolism/ Metal/ *Salmo sp.*/ Uptake efficiency (UE)/ Ventilation frequency (fv)}
509. Mani, V.G.T. and S.K. Konar. 1985. Chronic effects of malathion on feeding behavior, survival, growth and reproduction of fish. *Environ. Ecol.* **3**(3):348-350.  
{Keys: AChE/ Feed/ Pesticides/ Reproduction/ *Tilapia sp.*}
510. Mann, H. 1980. Consumption of oxygen by fish under the influence of megaphen. [Der Sauerstoffverbrauch von Fischen unter der Einwirkung von Megaphen]. In: *Contributions to Fish Ecology [Beitraege zur Fische Oekologie]*, pp. 54-58. Fischer, Stuttgart (GFR). [German].  
{Keys: *Salmo sp./ Tilapia sp./ Trout/ Ventilation/ VO<sub>2</sub>*}
511. Manna, A.K. and J.J. Ghosh. 1987. Anaerobic toxicity of sublethal concentration of Carbaryl (Sevin) to guppy (*Lebistes reticulatus*). *Environ. Ecol.* **5**(3):447-450.  
{Keys: LC<sub>50</sub>/ Pesticides/ Ventilation}
512. Marchetti, R. 1962. *Biologica e tossicologia delle acque usate*. Editrice Technica Artistica Scientifica, Milano (Italy). 386 pp. [Italien].  
{Keys: Acid/ Alcohol/ Ammonia/ Attached electrodes/ EKG/ Phenol/ Ventilation frequency (fv)}
513. Marshall, W.C. 1972. *Non-contact sensing of electric fields surrounding trout*. Masters Thesis. University of Wyoming, Laramie. 20 pp.  
{Keys: External electrodes/ Ventilation}
514. Marshall, W.C. and G. Snyder. 1977. Monitoring the respiration of marine fishes by noncontact sensing techniques. In: *Proceedings of the First International Conference on Wildlife. International Conference on Wildlife Biotelemetry* (F.M. Long, ed.), pp. 58-62. University of Wyoming, Laramie (WY).  
{Keys: Ventilation}

515. Martens, D.W., R.W. Gordon and J.A. Servizi. 1970. *Toxicity of copper to sockeye and pink salmon during their early fresh-water life*. Manuscript Report. International Pacific Salmon Fisheries Commission. 27 pp.  
{Keys: Cough/ Ventilation}
516. Marvin, D.E. and A.G. Heath. 1968. Cardiac and respiratory responses to gradual hypoxia in three ecologically distinct species of fresh-water fish. *Comp. Biochem. Physiol.* **27A**:349-355.  
{Keys: Anesthetic/ Attached electrodes/ Bluegill/ Catfish/ Heart frequency (fh)/ *Ictalurus sp./ Lepomis sp./ MS<sub>222</sub>/ Salmo sp./* Trout/ Ventilation/ Ventilation frequency (fv)/ Ventilation volume (VG)/ VO<sub>2</sub>}
517. Marvin, D.E. and D.T. Burton. 1973. Cardiac and respiratory responses of rainbow trout, bluegills and brown bullhead catfish during rapid hypoxia and recovery under normoxic conditions. *Comp. Biochem. Physiol.* **46A**:755-765.  
{Keys: Heart frequency (fh)/ *Ictalurus sp./ Lepomis sp./ Salmo sp./* Ventilation frequency (fv)/ VO<sub>2</sub>}
518. Massabuau, J.C., P. Dejours and Y. Sakakibara. 1984. Ventilatory CO<sub>2</sub> drive in the crayfish: Influence of oxygen consumption level and water oxygenation. *J. Comp. Physiol. B.* **154**(1B):65-72.  
{Keys: Hypoxia/ Invertebrate/ PCO<sub>2</sub>/ Ventilation frequency (fv)/ VO<sub>2</sub>}
519. Mathur, D.S. 1969. Toxicity of aldrin to certain fish. *Sci. Cult.* **35**(8):418-419.  
{Keys: *Channa sp./ Cyclodiene/ Pesticides/ Puntius sp./* Ventilation frequency (fv)}
520. McCloskey, J.T. and J.T. Oris. 1991. Effect of water temperature and dissolved oxygen concentration on the photo-induced toxicity of anthracene to juvenile bluegill sunfish (*Lepomis macrochirus*). *Aquat. Toxicol.* **21**(3-4):145-156.  
{Keys: LC<sub>50</sub>/ Light/ O<sub>2</sub>/ Temperature/ UV light/ Ventilation frequency (fv)}
521. McDonald, D.G. and B.R. McMahon. 1977. Respiratory development in Arctic char (*Salvelinus alpinus*) under conditions of normoxia and chronic hypoxia. *Can. J. Zool.* **55**:1461-1467.  
{Keys: Gill damage/ Heart frequency (fh)/ Morphology/ PO<sub>2</sub>/ Ventilation frequency(fv)}
522. McDonald, D.G., C.M. Wood and B.R. McMahon. 1980. Ventilation and oxygen consumption in the Dungeness crab (*Cancer magister*). *J. Exp. Zool.* **213**(1):123-136.  
{Keys: Heart frequency (fh)/ Invertebrate/ Uptake efficiency (UE)/ Ventilation frequency (fv)/ VO<sub>2</sub>}

523. McFarland, W.N. 1959. *A study of general anesthesia in teleosts with a discussion of its implications to the transportation of fishes.* Ph.D. Thesis, University of California, Los Angeles. 209 pp.  
{Keys: Anesthetic/ Heart/ Ventilation}
524. McFarland, W.N. 1959. A study of the effects of anesthetics on the behavior and physiology of fishes. *Publ. Inst. Mar. Sci.* **6**:23-55.  
{Keys: Alcohol/ Amytal/ Anesthetic/ Azacyclonal/ Barbital/ Behavior/ Bromide/ Chlorobutanol/ Chlorohydrate/ Chlorpromazine/ Cyanide/ Ethanol/ *Fundulus sp./ Girella sp./* Heart frequency (fh)/ Iodoacetate/ Magnesium (Mg)/ Meprobamate/ Metabolism/ Methylparafynol/ Morphine/ MS<sub>222</sub>/ *Paralabrax sp./* Reserpine/ Temperature/ Urethane/ Ventilation frequency (fv)}
525. McFarland, W.N. and G.W. Klontz. 1969. Anesthesia in fishes. *Fed. Proc.* **28**:1535-1540.  
{Keys: Anesthetic/ Ventilation}
526. McIntosh, A.W. and W.E. Bishop. 1976. Distribution and effects of heavy metals in a contaminated lake. *Tech. Report No. 85.* pp. 1-69. Purdue University Water Resources Research Center, West Lafayette (IN).  
{Keys: Bluegill/ Cadmium (Cd)/ Cough/ Cough frequency (fc)/ Metal/ Ventilation}
527. McKendrick, J. 1879-1880. On the respiratory movements of fishes. *J. Anat. Physiol.* **14**:461-466.  
{Keys: Ventilation}
528. McKim, J.M. and H.M. Goeden. 1982. A direct measure of the uptake efficiency of a xenobiotic chemical across the gills of brook trout (*Salvelinus fontinalis*) under normoxic and hypoxic conditions. *Comp. Biochem. Physiol.* **72C**(1):65-74.  
{Keys: Endrin/ Ventilation}
529. McKim, J.M. and E.M. Heath. 1983. Dose determinations for waterborne 2, 5, 2', 5'-[<sup>14</sup>C]tetrachlorobiphenyl and related pharmacokinetics in two species of trout (*Salmo gairdneri* and *Salvelinus fontinalis*): A mass-balance approach. *Toxicol. Appl. Pharmacol.* **68**(2):177-187.  
{Keys: Ventilation}
530. McKim, J.M., P.K. Schmieder and G.D. Veith. 1985. Absorption dynamics of organic chemical transport across trout gills as related to octanol-water partition coefficient. *Toxicol. Appl. Pharmacol.* **77**:1-10.  
{Keys: Ventilation}

531. McKim, J.M., P.K. Schmieder and R.J. Erickson. 1986. Toxicokinetic modeling of C-14 Pentachlorophenol in the rainbow trout (*Salmo gairdneri*). *Aquat. Toxicol.* **9**(1):59-80.  
{Keys: Ventilation}
532. McKim, J.M., S.P. Bradbury and G.J. Niemi. 1987. Fish acute toxicity syndromes and their use in the QSAR approach to hazard assessment. *Environ. Health Perspect.* **71**:171-186.  
{Keys: AChE/ Anesthetic/ Blocker/ Convulsant/ Irritant/ Uncoupler/ Ventilation}
533. McKim, J.M., P.K. Schmieder, R.W. Carlson, E.P. Hunt and G.J. Niemi. 1987. Use of respiratory-cardiovascular responses of rainbow trout (*Salmo gairdneri*) in identifying acute toxicity syndromes in fish: Part 1. Pentachlorophenol, 2, 4-dinitrophenol, tricaine methanesulfonate and 1-octanol. *Environ. Toxicol. Chem.* **6**(4):295-312.  
{Keys: Anesthetic/ Blood/ Cough/ MS<sub>222</sub>/ Uncoupler/ Uptake efficiency (UE)/ Ventilation/ VO<sub>2</sub>}
534. McKim, J.M., P.K. Schmieder, G.J. Niemi, R.W. Carlson and T.R. Henry. 1987. Use of respiratory-cardiovascular responses of rainbow trout (*Salmo gairdneri*) in identifying acute toxicity syndromes in fish: Part 2. Malathion, carbaryl, acrolein and benzaldehyde. *Environ. Toxicol. Chem.* **6**(4):313-328.  
{Keys: AChE/ Cough/ Irritant/ Pesticides/ Uptake efficiency (UE)/ Ventilation/ VO<sub>2</sub>}
535. McKim, J.M. and R.J. Erickson. 1991. Environmental impacts on the physiological mechanisms controlling xenobiotic transfer across fish gills. *Physiol. Zool.* **64**(1):39-67
536. McLeay, D.J., T.E. Howard and C.C. Walden. 1972. Sublethal effects of bleached kraft mill effluents to fish. CPAR Rept. 9-5. 15 pp. Canadian Forest Service, Ottawa (Canada).  
{Keys: Ventilation}
537. McMahon, B.R. and J.L. Wilkens. 1977. Periodic respiratory and circulatory performance in the red rock crab (*Cancer productus*). *J. Exp. Zool.* **202**(3):363-374.  
{Keys: Invertebrate/ Ventilation}
538. McMahon, B.R., F. Sinclair, C.D. Hassall, P.L. deFur and P.R.H. Wilkes. 1978. Ventilation and control of acid-base status during temperature acclimation in the crab (*Cancer magister*). *J. Comp. Physiol.* **128**(2):109-116.  
{Keys: Heart/ Invertebrate/ PCO<sub>2</sub>/ Seawater/ Temperature/ Ventilation frequency (fv)/ Ventilation volume (VG)/ VO<sub>2</sub>}

539. McPhearson, B.P. 1973. *Effects of methylmercury exposure on sea water adaptation of juvenile salmonids*. Ph.D. Thesis. Oregon State University, Corvallis (OR). 89 pp.  
{Keys: Coho/ Cough/ Light/ Metal/ Noise/ Trout/ Ventilation}
540. McVicar, A.J. and J.C. Rankin. 1983. Renal function in unanaesthetized river lampreys (*Lampetra fluviatilis* L): Effects of anaesthesia, temperature and environmental salinity. *J. Exp. Biol.* **105**:351-362.  
{Keys: Anesthetic/ MS<sub>222</sub>/ Salt/ Temperature/ Ventilation}
541. Meister, A.L. and C.F. Ritzi. 1958. Effects of chlorethane and MS<sub>222</sub> on eastern brook trout. *Prog. Fish Cult.* **20**:104-110.  
{Keys: Anesthetic/ MS<sub>222</sub>/ Temperature/ Ventilation}
542. Metcalfe, J.D. and P.J. Butler. 1984. Changes in activity and ventilation in response to hypoxia in unrestrained, unoperated dogfish (*Scyliorhinus canicula* L). *J. Exp. Biol.* **108**:411-418.  
{Keys: Ventilation}
543. Meyer, H. 1935. Die Atmung von *Uranoscopus scaber* in ihrer Abhangigkeit vom Sauerstoffdruck, vom pH und vom der Temperatur in Aussenmedium. *Z. Vergl. Physiol.* **22**:435-449.  
{Keys: Stargazer/ Ventilation}
544. Middaugh, D.P., L.E. Burnett and J.A. Couch. 1980. Toxicological and physiological responses of the fish (*Leiostomus xanthurus*) exposed to chlorine produced oxidants. *Estuaries*. **3**(2):132-141.  
{Keys: Blood/ Gill/ Morphology/ Uptake efficiency (UE)/ Ventilation/ Visual/ VO<sub>2</sub>}
545. Miller, W.R. III, F.W. Sandwell and P.A. Gorton. 1980. A monitoring chamber for trout behavior and physiology. In: *A Handbook on Biotelemetry and Radio Tracking* (C.J. Amlaner Jr. and D.W. Macdonald, eds.), pp. 307-311. Pergamon Press, Oxford.  
{Keys: Cough/ External electrodes/ Heart/ Locomotion/ Ventilation}
546. Miller, W.R. III., J. Cairns Jr., D. Gruber and A.C. Hendricks. 1978. The use of a recent concept in biological monitoring to study the ventilatory rate changes in bluegill sunfish (*Lepomis macrochirus*) following exposure to chlorine. *Am. Zool.* **18**(3):366.  
{Keys: Data acquisition/ Effluent/ External electrodes/ Ventilation}

547. Miller, W.R. III., D. Gruber, J. Cairns Jr., A.C. Hendricks and R.C. Hoehn. 1980. Biological monitoring of chlorine-induced ventilatory changes in bluegill sunfish (*Lepomis macrochirus*). In: *Water Chlorination. Environmental Impact and Health Effects. Proceedings of the 3rd Conference on Water Chlorination: Environmental Impact and Health Effects. Vol. 3* (R.L. Jolley, W.A. Brungs and R.B. Cumming, eds.), pp. 589-597. Ann Arbor Science Publishers Inc., Ann Arbor (MI).  
{Keys: Ventilation}
548. Milton, P. and R.N. Dixon. 1980. Further studies of the effects of the anaesthetic quinaldine on the physiology of the intertidal teleost (*Blennius pholis*). *J. Mar. Biol. Assoc. U.K.* **60**(4):1043-1051.  
{Keys: Anesthetic/ Seawater/ VO<sub>2</sub>}
549. Mitsuda, H., K. Nakajima, H. Mizuno, F. Kawai and A. Yamamoto. 1980. Effects of carbon dioxide on carp. *J. Nutr. Sci. Vitaminol.* **26**(1):99-102.  
{Keys: Anesthetic/ CO<sub>2</sub>}
550. Mitsuda, H., S. Ueno, H. Mizuno, T. Ueda, H. Fujikawa, T. Nohara and C. Fukuda. 1982. Levels of CO<sub>2</sub> in arterial blood of carp under carbon dioxide anesthesia. *J. Nutr. Sci. Vitaminol.* **28**:35-39.  
{Keys: Anesthetic/ Ventilation}
551. Moeck, A. and G. Peters. 1990. Lysozyme activity in rainbow trout (*Oncorhynchus mykiss* Walbaum), stressed by handling, transport and water pollution. *J. Fish Biol.* **37**(6):873-885.  
{Keys: Ammonia/ Blood/ Ventilation frequency (fv)}
552. Moffitt, B.P. and L.I. Crawshaw. 1983. Effects of acute temperature change on metabolism, heart rate, and ventilation frequency in carp (*Cyprinus carpio* L) *Physiol. Zool.* **56**(3):397-403.  
{Keys: Heart frequency (fh)/ Temperature/ Ventilation frequency (fv)}
553. Moody, N.J.G. and J. Owens. 1994. Experimental demonstration of the pathogenicity of a frog virus (*Bohole iridovirus*) for a fish species, barramundi (*Lates calcarifer*). *Dis. Aquat. Org.* **18**(2):95-102.  
{Keys: Ventilation}
554. Morgan, E.L. and K.W. Eagleson. 1978. Resource management by remote biological water quality monitoring and satellite data retrieval. In: *Surface Mining and Fish Wildlife Needs in the Eastern United States. Proceedings of a symposium. Biological Services Program. FWS OBS-78 81*. pp. 89-92. Fish and Wildlife Service, Department of the Interior, Washington (D.C.).  
{Keys: Ventilation}

555. Morgan, E.L. and R.C. Young. 1984. Automated fish respiratory monitoring system for stream acidification episode assessment. *Verh. Int. Ver. Theor. Angew. Limnol.-- Proc. Int. Assoc. Theor. Appl. Limnol.--Trav. Assoc. Int. Limnol. Theor. Appl.* 22(3):1432-1435.  
{Keys: Acid/ Data acquisition/ *Lepomis* sp./ pH/ *Salmo* sp./ Ventilation frequency (fv)}
556. Morgan, E.L., R.C. Young and C.M. Crane. 1985. Automated multispecies biomonitoring employing fish and aquatic invertebrates of various trophic levels. In: *Freshwater Biological Monitoring: Proceedings of a Specialized Conference Held in Cardiff, UK, 12-14 September 1984* (D. Pascoe and R.W. Edwards, eds.), pp. 75-80. Pergamon Press, New York.  
{Keys: Data acquisition}
557. Morgan, E.L., K.W. Eagleson, T.P. Weaver and B.G. Isom. 1986. Linking automated biomonitoring to remote computer platforms with satellite data retrieval in acidified streams. In: *Impact of Acid Rain and Deposition on Aquatic Biological Systems. ASTM STP 928* (B.G. Isom, S.D. Dennis and J.M. Bates, eds.), pp. 84-91. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Ventilation}
558. Morgan, W.S.G. and P.C. Kuhn. 1974. A method to monitor the effects of toxicants upon breathing rate of largemouth bass (*Micropterus salmoides* L.). *Water Res.* 8:67-77.  
{Keys: Ammonia/ Anesthetic/ Cadmium (Cd)/ Copper (Cu)/ Cyanide/ Metal/ Narcosis/ Phenol/ Ventilation frequency (fv)}
559. Morgan, W.S.G. 1975. The development of an automated biological monitoring system to control water quality. *Water Report.* 2:2-3. National Institute for Water Research (NIWR) of the CSIR, P.O. Box 395, Pretoria 0001 (S. Africa).  
{Keys: Data acquisition/ Ventilation frequency (fv)}
560. Morgan, W.S.G. 1975. Monitoring pesticides by means of changes in electric potential caused by fish opercular rhythms. *Prog. Water Technol.* 7(2):33-40. (Also: Same title in Proc 7th Intnl Conf on Water Pollut Res Paris 1974 Pergamon Press Lond).  
{Keys: Bass/ Carbaryl (Sevin)/ Chlordane/ External electrodes/ Parathion/ PCP/ Pesticides/ Ventilation}

561. Morgan, W.S.G. 1976. Fishing for toxicity: Biological automation for continuous water quality control. *Effluent Water Treat. J.* **16**:471-475.  
{Keys: Ammonia/ *Barbus sp.*/ Bass/ Cadmium (Cd)/ Carbonate/ Chlorine (Cl)/ Copper (Cu)/ Cyanide/ Data acquisition/ External electrodes/ Lead (Pb)/ Mercury (Hg)/ Metal/ *Micropterus sp.*/ Parathion/ PCP/ *Sarotherodon sp.*/ Ventilation frequency (fv)}
562. Morgan, W.S.G. 1977. Biomonitoring with fish: An aid to industrial effluent and surface water quality control. *Prog. Water Technol.* **9**:703-711.  
{Keys: Ammonia/ *Barbus sp.*/ Cadmium (Cd)/ Carbamate/ Chlordane/ Copper (Cu)/ Cyanide/ External electrodes/ Lead (Pb)/ Mercury (Hg)/ *Micropterus sp.*/ Parathion/ PCP/ Phenol/ *Sarotherodon sp.*/ Ventilation frequency (fv)}
563. Morgan, W.S.G. 1977. An electronic system to monitor the effects of changes in water quality on fish opercular rhythms. In: *Biological Monitoring of Water and Effluent Quality. ASTM STP 607* (J. Cairns Jr., K.L. Dickson and G.F. Westlake, eds.), pp. 38-55. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Ventilation frequency (fv)}
564. Morgan, W.S.G. 1978. The use of fish as a biological sensor for toxic compounds in potable water. *Prog. Water Technol.* **10**(½):395-398.  
{Keys: Ventilation frequency (fv)}
565. Morgan, W.S.G. 1979. Fish locomotor behavior patterns as a monitoring tool. *J. Water Pollut. Cont. Fed.* **51**(3):580-588.  
{Keys: Ammonia/ Cadmium (Cd)/ Copper (Cu)/ Cyanide/ Mercury (Hg)/ Metal/ Phenol/ Ventilation}
566. Morgan, W.S.G. 1984. The utilization of fish biomonitoring for industrial effluent control in South Africa. *Water Qual. Bull.* **10**(1):52-57.
567. Morgan, W.S.G. and P.C. Kuhn. 1985. Aspects of utilizing continuous automatic fish biomonitoring systems for industrial effluent control. In: *Freshwater Biological Monitoring. Proceedings of a Specialized Conference Held in Cardiff, U.K., 12-14 September 1984* (D. Pascoe and R.W. Edwards. Eds.), pp. 65-74. Pergamon Press, New York.  
{Keys: Activity/ Ventilation}
568. Morrow, J.E., R.L. Gritz and M.P. Kirton. 1975. Effects of some components of crude oil on young coho salmon. *Copeia*. **2**:326-331.  
{Keys: Benzene/ Cough/ Heptane/ Octane/ Pentane/ Toluene/ Xylene}

569. Moyle, P.B. and J.J. Cech Jr. 1996. *Fishes. An Introduction to Ichthyology*. 3 ed. Prentice Hall, Upper Saddle River (NJ). 590 pp.  
{Keys: Behavior/ Blood/ Cardiovascular system/ Heart/ Morphology/ Nervous system/ Review/ Ventilation}
570. Mueller, R.A., D.B.A. Lundberg, G.R. Breese, J. Hedner, T. Hedner and J. Jonason. 1982. The neuropharmacology of respiratory control. *Pharmacol. Rev.* 34(3):255-285.  
{Keys: Mammal/ Ventilation}
571. Muir, B.S. and R.M. Buckley. 1967. Gill ventilation in *Remora remora*. *Copeia*. 3:581-586.  
{Keys: Ventilation}
572. Murphy, J.C., C.T. Garten Jr., M.H. Smith and E.A. Standora. 1976. Thermal tolerance and respiratory movement of bluegill from two populations tested at different levels of acclimation temperature and water hardness. In: *Thermal Ecology II. ERDA Symposium Series (CONFF-750425)* (G.W. Esch and R.W. McFarlane, eds.), 7 pp.  
{Keys: Hardness/ Temperature/ Ventilation}
573. Nagendran, R. and K. Shakuntala. 1979. Studies on the toxicity of biocides to cyprinid forage fishes: Part 1--Effects of sublethal concentrations of sodium pentachlorophenate on the ecophysiology of (*Puntius ticto* Ham). *Indian J. Exp. Biol.* 17:270-273.  
{Keys: Activity/ Feed/ NaPCP/ Ventilation}
574. Neiheisel, T.W. 1968. *Application of an electrical detecting and recording technique for studying the frequency of opercular movements of fish in response to some environmental variables*. Masters Thesis. University of Cincinnati, Cincinnati (OH). 63 pp.  
{Keys: Ventilation frequency (fv)}
575. Neville, C.M. 1979. Sublethal effects of environmental acidification on rainbow trout (*Salmo gairdneri*). *J. Fish. Res. Board Can.* 36:84-87.  
{Keys: Blood/ H+/ PCO<sub>2</sub>/ PO<sub>2</sub>/ Ventilation}
576. Neville, C.M. 1979. Ventilatory response of rainbow trout (*Salmo gairdneri*) to increased H<sup>+</sup> ion concentration in blood and water. *Comp. Biochem. Physiol.* 63A:373-376.  
{Keys: CO<sub>2</sub>/ PCO<sub>2</sub>/ Pressure/ Ventilation frequency (fv)}
577. Neville, C.M. 1979. Influence of mild hypercapnia on the effects of environmental acidification on rainbow trout (*Salmo gairdneri*). *J. Exp. Biol.* 83:345-349.

578. Neville, C.M. 1985. Physiological response of juvenile rainbow trout (*Salmo gairdneri*, ) to acid and aluminum: Prediction of field responses from laboratory data. *Can. J. Fish. Aquat. Sci.* **42**(12):2004-2019.  
{Keys: Activity/ Aluminum (Al)/ Cough/ Cough frequency (fc)/ Ventilation frequency (fv) Visual}
579. Nevitt, G.A. 1991. *Peripheral mechanisms of olfaction in two teleostean fishes*. Ph.D. Dissertation Washington University, Seattle (WA). 118 pp.  
{Keys: Cough/ Flounder/ Olfactory/ Salmon}
580. New, J.G. and D. Bodznick. 1990. Medullary electrosensory processing in the little skate. 2. Suppression of self-generated electrosensory interference during respiration. *J. Comp. Physiol. A.* **167**(2):295-307.  
{Keys: Nervous system/ Ventilation}
581. Nichols, J.W., J.M. McKim, G.J. Lien, A.D. Hoffman and S.L. Bertelsen. 1991. Physiologically based toxicokinetics modeling of three waterborne chloroethanes in rainbow trout (*Oncorhynchus mykiss*). *Toxicol. Appl. Pharmacol.* **110**:374-389.  
{Keys: Ventilation}
582. Nielsen, D.L. and H.M. King. 1995. Biomonitoring of paper mill effluent using fish ventilatory signals. *Aust. J. Ecotoxicol.* **1**(2):113-116.  
{Keys: Ventilation frequency (fv)}
583. Nikinmaa, M. and R.E. Weber. 1984. Hypoxic acclimation in the lamprey (*Lampetra fluviatilis*): Organismic and erythrocytic responses. *J. Exp. Biol.* **109**:109-119.  
{Keys: Blood/ Hypoxia/ O<sub>2</sub>/ PO<sub>2</sub>/ Ventilation frequency (fv)/ VO<sub>2</sub>}
584. Nomura, S., T. Iberaki, H. Hirose and S. Shirahata. 1972. Application of backpack cardiotelometer for fishes. 1. Heart rate and cardiac reflex in fishes during unrestrained swimming. *Bull. Jpn. Soc. Sci. Fish.* **38**:1105-1117. [Japanese].  
{Keys: Carp/ *Cyprinus* sp./ EKG/ Heart frequency (fh)/ *Oncorhynchus* sp./ *Salmo* sp./ Salmon/ Swimming/ Telemetry/ Trout/ Ventilation}
585. Nomura, K. and I. Akiyama. 1984. New method for measurement of electrocardiograms in unrestrained fish swimming free of electrodes. *Bull. Jpn. Soc. Sci. Fish.* **50**(6):959-967. [Japanese].  
{Keys: Bitterling/ EKG/ Heart/ *Rhodeus* sp./ Swimming/ Ventilation}
586. North, A.W. 1996. Locomotory activity and behaviour of the Antarctic teleost (*Notothenia coriceps*). *Mar. Biol.* **126**(1):125-132.  
{Keys: Swimming/ Ventilation}

587. Nunn, G.L., J. Cairns Jr. and D. Gruber. 1982. The distribution of ventilatory frequencies over time of the bluegill (*Lepomis macrochirus*). *J. Interdiscip. Cycle. Res.* **13**(1):37-48.  
{Keys: Ventilation frequency (fv)}
588. O'Hara, J. 1971. A continuously monitored respiration chamber for fish. *Water Res.* **5**:143-145.  
{Keys: Respirometry/ Ventilation}
589. O'Hara, J. 1971. Alterations in oxygen consumption by bluegills exposed to sublethal treatment with copper. *Water Res.* **5**:321-327.  
{Keys: Copper (Cu)/ *Lepomis* sp./ TLm/ Ventilation/ Visual/ VO<sub>2</sub>}
590. Ogilvie, D.M. and D.M. Stechey. 1983. Effects of aluminum on respiratory responses and spontaneous activity of rainbow trout (*Salmo gairdneri*). *Environ. Toxicol. Chem.* **2**:43-48.  
{Keys: Activity/ Aluminum (Al)/ Cough frequency (fc)/ Metal/ Ventilation frequency (fv)}
591. Ohyama, F., K. Inoue, H. Fukuda and K.S. Iwata. 1978. Neuronal activities of the respiratory center of the crucian carp (*Carassius carassius* L) in relation to the cleaning motion. *Zool. Mag. Zool. Soc. Jpn.* **87**(2):103-108. [Japanese].  
{Keys: Cough/ Nervous system/ Ventilation}
592. Okwuosa, V.N. and E. Omoregie. 1995. Acute toxicity of alkylbenzene sulphonate (ABS) detergent to the toothed carp (*Aphyosemion gairdneri* L). *Aqua. Res.* **26**(10):755-758.  
{Keys: Gill damage/ LC<sub>50</sub>/ Ventilation frequency (fv)}
593. Olla, B.L., ed. 1974. Behavioral bioassays. In: *Marine Bioassays. Proceedings of Workshop Sponsored by The Marine Technological Society, Gulf Breeze Contribution No. 251.* pp. 1-31.  
{Keys: Ventilation}
594. Olowo, J.P. and L.J. Chapman. 1996. Papyrus swamps and variation in the respiratory behaviour of the African fish (*Barbus neumayeri*). *Afr. J. Ecol.* **34**(2):211-222.  
{Keys: O<sub>2</sub>/ Ventilation}
595. Olthof, H.J. 1934. Die Kohlensäure als Atremreiz bei Wassertieren, insbesondere bei Süsswasserfischen. *Z. Vgl. Physiol.* **21**:534-544.  
{Keys: CO<sub>2</sub>/ Minnow/ Perch/ Ventilation}

596. Opperhuizen, A. and S.M. Schrap. 1987. Relationships between aqueous oxygen concentration and uptake and elimination rates during bioconcentration of hydrophobic chemicals in fish. *Environ. Toxicol. Chem.* **6**(5):335-342.  
{Keys: O<sub>2</sub>/ Ventilation volume (VG)}
597. Oris, J.T. and J.P. Giesy Jr. 1985. The photoenhanced toxicity of anthracene to juvenile sunfish (*Lepomis*). *Aquat. Toxicol.* **6**(2):133-146.  
{Keys: Coal/ Gill damage/ LC<sub>50</sub>/ UV light/ Ventilation frequency (fv)}
598. Ormerod, S.J., N.S. Weatherly, P. French, S. Blake and W.M. Jones. 1987. The physiological response of brown trout (*Salmo trutta*) to induced episodes of low pH and elevated aluminum in a Welsh hill stream. In: *Ecophysiology of Acid Stress in Aquatic Organisms, Vol. 117, Suppl 1* (H. Witters and O. Vanderborght, eds.), pp. 435-447.  
{Keys: Aluminum (Al)/ Blood/ Metal/ Ventilation frequency (fv)}
599. Orsatti, S.D. and P.W. Colgan. 1987. Effects of sulfuric acid exposure on the behavior of largemouth bass (*Micropterus salmoides*). *Environ. Biol. Fishes* **19**(2):119-129.  
{Keys: Behavior/ Cough/ H+/ Visual}
600. Oseid, D. and L.L. Smith Jr. 1972. Swimming endurance and resistance to copper and malathion of bluegills treated by long-term exposure to sublethal levels of hydrogen sulfide. *Trans. Am. Fish. Soc.* **101**(4):620-625.  
{Keys: Copper (Cu)/ H<sub>2</sub>S/ Pesticides/ Swimming/ Ventilation}
601. Oswald, R.L. 1978. Injection anaesthesia for experimental studies in fishes. *Comp. Biochem. Physiol.* **60C**:19-26.  
{Keys: Alphaxalone/ Anesthetic/ Etorphine/ Propanidid/ Saffan sp./ Xylocaine}
602. Oswald, R.L. 1978. The use of telemetry to study light synchronization with feeding and gill ventilation rates in *Salmo trutta*. *J. Fish Biol.* **13**:729-739.  
{Keys: Attached electrodes/ Cough/ Electromyogram (EMG)/ Feed/ Telemetry/ Trout/ Ventilation frequency (fv)}
603. Otis, L.S., J.A. Cerf and G.J. Thomas. 1957. Conditioned inhibition of respiration and heart rate in the goldfish. *Science*. **126**:263-264.  
{Keys: Ventilation}
604. Ovais, M., S. Khan and R. Rushdi. 1977. Effect of copper sulphate and cadmium chloride on the behaviour of teleostean fishes. *Matsya*. No. 3, pp 99-100.  
{Keys: Activity/ Behavior/ Cadmium (Cd)/ *Clarias* sp./ Copper (Cu)/ *Heteroneustes* sp./ Metal/ Swimming/ Ventilation frequency (fv)}

605. Pal, A.K. and S.K. Konar. 1987. Long-term effects of organophosphorus insecticide methyl parathion on fish. *Environ. Ecol.* **5**(3):564-571.  
{Keys: Behavior/ Feed/ Growth/ Reproduction}
606. Paller, M.H. and R.C. Heidinger. 1979. The toxicity of ozone to the bluegill. *J. Environ. Sci. Health.* **A14**:169-193.  
{Keys: Activity/ Feed/ Ventilation}
607. Parker, V.H., J.M. Barnes and F.A. Denz. 1951. Some observations on the toxic properties of 3, 5-dinitro-o-cresol. *Br. J. Ind. Med.* **8**:226-233.  
{Keys: Blood/ DNOC/ Mammal/ Uncoupler}
608. Pasztor, V.M. and H. Kleerekoper. 1962. The role of the gill filament musculature in teleosts. *Can. J. Zool.* **40**:785-802.  
{Keys: *Ambloplites* sp./ Anesthetic/ Attached electrodes/ Bass/ Bullhead/ Carp/ Cough/ *Cyprinus* sp./ Electromyogram (EMG)/ External electrodes/ *Ictalurus* sp./ *Micropterus* sp./ MS<sub>222</sub>/ Urethane/ Ventilation}
609. Patel, K.R. and A.B. Saxena. 1983. Effect of potassium chromate on freshwater fishes (*Puntius ticto* and *Channa striatus*). *Indian J. Zool.* **11**(2):43-50.  
{Keys: Chromium (Cr)/ LC<sub>50</sub>/ Metal/ Ventilation frequency (fv)}
610. Patten, B.G. 1977. Sublethal biological effects of petroleum hydrocarbon exposures: Fish. In: *Effects of Petroleum on Arctic and Subarctic Marine Environments and Organisms* (D.C. Malins, ed.), pp. 319-35. Academic Press, Inc., New York.  
{Keys: Ventilation}
611. Pegg, W.J. and C.R. Jenkins. 1976. Physiological effects of sublethal levels of acid water on fish. In: *WRI-SVU-76-01. Bulletin No. 6*. U.S. Department of the Interior. Water Research Institute, West Virginia University, Morgantown (WV). 47 pp.  
{Keys: H+/ Ventilation}
612. Pennuto, C.M. and F. DeNoyelles Jr. 1993. Behavioral responses of *Drunella coloradensis* Ephemeroptera nymphs to short-term pH reductions. *Can. J. Fish. Aquat. Sci.* **50**(12):2692-2697.  
{Keys: Behavior/ Ventilation}
613. Perry, J.W. and M.W. Conway. 1977. Rotenone induced blood respiratory changes in the green sunfish (*Lepomis cyanellus*). *Comp. Biochem. Physiol.* **56C**:123-126.  
{Keys: Ventilation}
614. Perry, S.F., R. Kinkead and R. Fritzsche. 1992. Are circulating catecholamines involved in the control of breathing by fishes. *Rev. Fish Biol. Fish.* **2**(1):65-83.  
{Keys: Catechol/ Ventilation}

615. Perry, S.F. and D.G. McDonald. 1993. Gas exchange. In: *The Physiology of Fishes* (D.H. Evans, ed.), pp. 251-278. CRC Press, Boca Raton (FL).  
{Keys: Blood/ CO<sub>2</sub>/ Gill/ O<sub>2</sub>/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Review/ Ventilation/ VO<sub>2</sub>}
616. Peterson, M.S. and R.G. Gilmore Jr. 1991. Eco-physiology of juvenile snook (*Centropomus undecimalis* Bloch): Life history implications. *Bull. Mar. Sci.* **48**(1):46-57.  
{Keys: Blood/ Hypoxia/ Metabolism/ Ventilation/ VO<sub>2</sub>}
617. Peterson, R.H. 1975. Pectoral fin and opercular movements of Atlantic salmon (*Salmo salar*) alevins. *J. Fish. Res. Board Can.* **32**(5):643-647.  
{Keys: O<sub>2</sub>/ Ventilation}
618. Peyraud-Waitzenegger, M., T. Nomura and C. Peyraud. 1974. Cardiovascular and ventilatory effects of PGE<sub>2</sub> in the carp (*Cyprinus carpio* L.). *J. Physiologie.* **69**(2):286A.  
{Keys: Blood/ Heart/ Ventilation}
619. Peyraud-Waitzenegger, M. 1979. Simultaneous modifications of ventilation and arterial PO<sub>2</sub> by catecholamines in the eel (*Anguilla anguilla* L): Participation of alpha and beta effects. *J. Comp. Physiol.* **129**:343-354.  
{Keys: Ventilation}
620. Peyraud-Waitzenegger, M., L. Barthelemy and C. Peyraud. 1980. Cardiovascular and ventilatory effects of catecholamines in unrestrained eels (*Anguilla anguilla* L). A study of seasonal changes in reactivity. *J. Comp. Physiol.* **138**(4):367-375.  
{Keys: Heart/ Ventilation}
621. Piiper, J., M. Meyer, H. Worth and H. Willmer. 1977. Respiration and circulation during swimming activity in the dogfish (*Scyliorhinus stellaris*). *Respir. Physiol.* **30**:221-239.  
{Keys: Heart/ Swimming/ Ventilation}
622. Playle, R.C. and C.M. Wood. 1989. Water pH and aluminum chemistry in the gill microenvironment of rainbow trout during acid and aluminum exposures. *J. Comp. Physiol., B.* **159**(5):539-550.  
{Keys: Acid/ Aluminum (Al)/ Metal/ Ventilation/ VO<sub>2</sub>}
623. Plumb, J.A., T.E. Schweller and C. Limsuwan. 1983. Experimental anesthesia of three species of freshwater fish with etomidate. *Prog. Fish-Cult.* **45**(1):30-33.  
{Keys: Anesthetic/ Ventilation}

624. Poleo, A.B.S. and I.P. Muniz. 1993. The effect of aluminum in soft water at low pH and different temperatures on mortality, ventilation frequency and water balance in smoltifying Atlantic salmon (*Salmo salar*). *Environ. Biol. Fishes* **36**(3):193-203.  
{Keys: Aluminum (Al)/ Blood/ Metal/ Temperature/ Ventilation}
625. Powers, E.B. and R.T. Clark Jr. 1942. Control of normal breathing in fishes by receptors located in the regions of the gills and innervated by the IXth and Xth cranial nerves. *Am. J. Physiol.* **138**(1):104-107.  
{Keys: Ventilation}
626. Price, D.R.H. 1979. Fish as indicators of water quality. In: *Biological Indicators of Water Quality. Conference on the Biological Indicators of Water Quality* (A. James and L. Evison, eds.), pp. 8-1 to 8-23. John Wiley and Sons, New York.  
{Keys: Review/ Ventilation}
627. Priede, I.G. 1978. Behavioural and physiological rhythms of fish in their natural environment, as indicated by ultrasonic telemetry of heart rate. In: *Rhythmic Activity of Fishes* (J.W. Thorpe, ed.), pp. 153-168. Academic Press, London.  
{Keys: Cough/ Heart/ Ventilation}
628. Priede, I.G. 1980. An analysis of objectives in telemetry studies of fish in the natural environment. In: *A Handbook on Biotelemetry and Radio Tracking. Proceedings of an International Conference on Telemetry and Radio Tracking in Biology and Medicine* (C.J. Amlaner and D.W. Macdonald, eds.), pp. 105-118. Pergamon Press, Oxford.  
{Keys: Activity/ Telemetry/ Ventilation}
629. Priede, I.G. 1983. Heart rate telemetry from fish in the natural environment. *Comp. Biochem. Physiol.* **76A**(3):515-524.  
{Keys: EKG/ Heart frequency (fh)/ Telemetry/ Ventilation frequency (fv)}
630. Quetin, L.B., T.J. Mickel and J.L. Childress. 1978. A method for simultaneously measuring the oxygen consumption and activity of pelagic crustaceans. *Comp. Biochem. Physiol.* **59A**:263-266.  
{Keys: Invertebrate/ Ventilation/ VO<sub>2</sub>}
631. Ramalingam, R. and Y.S. Reddy. 1982. Kinetics of dose-response relationships in the bimodal respiration of (*Colisa lalia* Hamilton-Buchanan) exposed to lindane ( $\gamma$ -BHC). *Water Res.* **16**(1):1-5.  
{Keys: Behavior/ LC<sub>50</sub>/ Lindane/ Pesticides/ Ventilation/ VO<sub>2</sub>}
632. Rand, H.W. 1907. The functions of the spiracle of the skate. *Am. Nat.* **41**:287-302.  
{Keys: Cough/ Ventilation}

633. Randall, D.J. 1962. Effect of an anaesthetic on the heart and respiration of teleost fish. *Nature* **195**:506.  
{Keys: Heart frequency (fh)/ MS<sub>222</sub>/ Tench/ *Tinca* sp./ Ventilation frequency (fv)}
634. Randall, D.J. and G. Shelton. 1963. The effects of changes in environmental gas concentrations on the breathing and heart rate of a teleost fish. *Comp. Biochem. Physiol.* **9**: 229-239.  
{Keys: CO<sub>2</sub>/ Heart frequency (fh)/ O<sub>2</sub>/Ventilation frequency (fv)}
635. Randall, D.J., L.S. Smith and J.R. Brett. 1965. Dorsal aortic blood pressures recorded from the rainbow trout (*Salmo gairdneri*). *Can. J. Zool.* **43**:863-872.  
{Keys: Ventilation}
636. Randall, D.J. 1966. The nervous control of cardiac activity in the tench (*Tinca tinca*) and the goldfish (*Carassius auratus*). *Physiol. Zool.* **39**(3):185-192.  
{Keys: Heart/ Nervous system/ Ventilation}
637. Randall, D.J. and J.C. Smith. 1967. The regulation of cardiac activity in a hypoxic environment. *Physiol. Zool.* **40**:104-113.  
{Keys: Heart/ Ventilation}
638. Randall, D.J. and L.S. Smith. 1967. The effect of environmental factors on circulation and respiration in teleost fish. *Hydrobiologia*. **29**:113-124.  
{Keys: Anesthetic/ Blood/ Hypoxia/ MS<sub>222</sub>/ Ventilation}
639. Randall, D.J. 1970. Gas exchange in fish. In: *Fish Physiology, Vol. IV* (W.S. Hoar and D.J. Randall, eds.), pp. 253-92. Academic Press, New York.  
{Keys: Review/ Ventilation}
640. Randall, D.J. and J.N. Cameron. 1973. Respiratory control of arterial pH as temperature changes in rainbow trout (*Salmo gairdneri*). *Am. J. Physiol.* **225**(4):997-1002.  
{Keys: Blood/ Ventilation}
641. Randall, D.J. and D.R. Jones. 1973. The effect of differentiation of the pseudobranch on the respiratory response to hypoxia and hyperoxia in the trout (*Salmo gairdneri*). *Respir. Physiol.* **17**:291-301.  
{Keys: Blood/ PaO<sub>2</sub>/ Ventilation volume (VG)/ VO<sub>2</sub>}
642. Randall, D.J., N. Heisler and F. Drees. 1976. Ventilatory response to hypercapnia in the larger spotted dogfish (*Scyliorhinus stellaris*). *Am. J. Physiol.* **230**(3):590-594.  
{Keys: CO<sub>2</sub>/ Ventilation}

643. Randall, D.J. 1982. The control of respiration and circulation in fish during exercise and hypoxia. *J. Exp. Biol.* **100**:275-288.  
{Keys: Heart frequency (fh)/ Ventilation}
644. Randall, D.J., S.F. Perry and T.A. Heming. 1982. Gas transfer and acid-base regulation in salmonids. *Comp. Biochem. Physiol.* **73B**(1):93-103.  
{Keys: CO<sub>2</sub>/ Ventilation}
645. Randall, D.J. and C. Daxboeck. 1984. Oxygen and carbon dioxide transfer across fish gills. In: *Fish Physiology: Gills --Anatomy, Gas Transfer, and Acid-Base Regulation. Part A, Vol. 10* (W.S. Hoar and D.J. Randall, eds.), pp. 263-314. Academic Press, New York.  
{Keys: Blood/ Review/ Ventilation}
646. Randall, D.J. and E.W. Taylor. 1991. Evidence of a role for catecholamines in the control of breathing in fish. *Rev. Fish. Biol. Fish.* **1**(2):139-157.  
{Keys: Cardiovascular system/ Catechol/ Chemosensitive/ Hypoxia/ Propranolol/ Ventilation}
647. Rani, A.U. and R. Ramamurthi. 1987. Cadmium induced behavioral abnormalities of the fish (*Tilapia mossambica*). *Environ. Ecol.* **5**(1):168-169.  
{Keys: Cadmium (Cd)/ Metal/ Ventilation}
648. Rantin, F.T. and K. Johansen. 1984. Responses of the teleost (*Hoplias malabaricus*) to hypoxia. *Environ. Biol. Fishes* **11**(3):221-228.  
{Keys: PO<sub>2</sub>/ Ventilation frequency (fv)/ Ventilation volume (VG)/ VO<sub>2</sub>}
649. Rao, D.G.P. and Y.P. Rao. 1979. Effect of low oxygen concentration on respiratory movements of *Balanus tintinnabulum* L. *Indian J. Mar. Sci.* **8**(2):115-117.  
{Keys: O<sub>2</sub>/ Ventilation}
650. Rao, K.R.S.S., K.S.P. Rao and K.V.R. Rao. 1984. Impact of technical and commercial grade phenthoate on some selected parameters of oxidative metabolism in the fish (*Channa punctatus* Bloch). *Indian Ecol.* **11**(1):6-11.  
{Keys: Ventilation frequency (fv)/ VO<sub>2</sub>}
651. Rath, S. and B.N. Misra. 1979. Sub-lethal effects of Dichlorvos (DDVP) on respiratory metabolism of (*Tilapia mossambica* Peters) of 3 age groups. *Exp. Gerontol.* **14**:37-41.  
{Keys: Pesticides/ Ventilation}

652. Rathore, H.S., N. Kapil and R.C. Saxena. 1983. Pilot study on the effects of acid on the respiratory behavior of cadmium chloride treated fish (*Heteropneustes fossilis*). *Indian J. Zool.* **11**(2):57-60.  
 {Keys: Cadmium (Cd)/ Metal/ Ventilation frequency (fv)}
653. Read, A.J. and D.E. Gaskin. 1985. Radio tracking the movements and activities of harbor porpoise (*Phocaena phocaena* L) in the Bay of Fundy, Canada. *Fish. Bull.* **83**(4):543-552.  
 {Keys: Activity/ Telemetry/ Ventilation}
654. Reiber, C.L. 1997. Ontogeny of cardiac and ventilatory function in the crayfish *Procambarus clarkii*. *Am. Zool.* **37**(1):73-81.  
 {Keys: Heart/ Invertebrate/ Ventilation}
655. Remorov, V.A. 1962. Electrocardiogram recording in long-term experiments. In: *Techniques for the Investigation of Fish Physiology* (E.N. Pavlovskii, ed.), pp. 25-26. Akademiya Nauk SSSR, Ikhtiologicheskaya Komissiya. [Translation from the Russian: The Israel Program for Scientific Translations, 1964. U.S. Department of the Interior and the National Science Foundation. 313 pp. ].  
 {Keys: EKG/ Heart/ Ventilation}
656. Reynolds, F.A. and T.A. Haines. 1980. Effects of chronic exposure to hydrogen sulphide on newly hatched brown trout (*Salmo trutta* L). *Environ. Pollut., Ser. A.* **22**:11-17.  
 {Keys: Gill damage/ H<sub>2</sub>S/ LC<sub>50</sub>/ Ventilation}
657. Reynolds, W.W. 1977. Thermal equilibration rates in relation to heartbeat and ventilatory frequencies in largemouth blackbass (*Micropterus salmoides*). *Comp. Biochem. Physiol.* **56A**:195-201.  
 {Keys: Bass/ Heart frequency (fh)/ Temperature/ Ventilation frequency (fv)}
658. Rice, S.D., R.E. Thomas and J.W. Short. 1977. Effect of petroleum hydrocarbons on breathing and coughing rates and hydrocarbon uptake-depuration in pink salmon fry. In: *Physiological Responses of Marine Biota to Pollutants* pp. 259-277. Academic Press, New York.  
 {Keys: Cough frequency (fc)/ Oil/ TLm/ Ventilation frequency (fv)}
659. Rice, S.D., J.F. Karinen and S. Korn. 1978. Acute and chronic toxicity, uptake and depuration, and sublethal response of Alaska marine organisms to petroleum hydrocarbons. In: *Marine Biological Effects of OCS Petroleum Development* (D.A. Wolfe, ed.). pp. 11-24. NOAA/ ERL, Boulder (CO). [NOAA Tech. Memo NOAA-TM-ERL-OCSEAP].  
 {Keys: Mode of action/ Oil/ Ventilation}

660. Roberts, G.L. 1978. Ram gill ventilation in fish. In: *The Physiological Ecology of Tunas* (G.D. Sharp and A.E. Dizon, eds.), pp. 83-88. Academic Press, New York.  
{Keys: Ventilation}
661. Roberts, J.L. 1964. Metabolic responses of freshwater sunfish to seasonal photoperiods and temperatures. *Helgol. Wiss. Meeresunters.* **9**(1):459-473.  
{Keys: Temperature/ Ventilation}
662. Roberts, J.L. and G.M. Hughes. 1967. Gill ventilation and stress in trout. *Am. Zool.* **7**:731.  
{Keys: Temperature/ Ventilation}
663. Roberts, J.L. 1973. Effects of thermal stress on gill ventilation and heart rate in fishes. In: *Responses of Fish to Environmental Changes* (W. Chavin, ed.), pp. 64-85. Charles C. Thomas, Springfield (IL).  
{Keys: Ventilation}
664. Roberts, J.L. 1975. Active branchial and ram ventilation in fishes. *Biol. Bull.* **148**:85.  
{Keys: Swimming/ Ventilation}
665. Roberts, J.L. 1975. Cardio-ventilatory interactions during swimming, and during thermal and hypoxic stress. In: *Respiration of Marine Organisms. Proceedings of the Marine Section, First Marine Biomedical Science Symposium. 14-15 March 1975. Augusta (Maine)*. (J.J. Cech Jr., D.W. Bridges and D.B. Horton, eds.), pp. 139-154. The Research Institute of the Gulf of Maine, South Portland (Maine).  
{Keys: Heart/ Nervous system/ Startle/ Ventilation}
666. Robotham, P.W.J. 1979. A comparison of ventilation rates and haemoglobin concentrations between two species of loach (*Noemacheilus barbatulus* L and *Cobitis taenia* L). *Hydrobiologia*. **66**(2):177-180.  
{Keys: Blood/ Haemoglobin/ O<sub>2</sub>/ Ventilation frequency (fv)}
667. Rogers, S.C. and A.H. Weatherley. 1983. The use of opercular muscle electromyograms as an indicator of the metabolic costs of fish activity in rainbow trout (*Salmo gairdneri* Richardson) as determined by radiotelemetry. *J. Fish Biol.* **23**(5):535-547.  
{Keys: Activity/ Electromyogram (EMG)/ Telemetry/ Ventilation/ VO<sub>2</sub>}
668. Rommel, S.A., Jr. 1973. A simple method for recording fish heart and operculum beats without the use of implanted electrodes. *J. Fish. Res. Board Can.* **30**:693-694.  
{Keys: External electrodes/ Ventilation}

669. Rooney, D.J. and P.R. Laming. 1984. Effect of olfactory bulb ablation on cardiac and ventilatory arousal responses and their habituation in the goldfish (*Carassius auratus*). *Behav. Neural Biol.* **42**(2):120-126.  
{Keys: Activity/ Chemosensitive/ Feed/ Heart/ Olfactory/ Ventilation}
670. Rooney, D.J. and P.R. Laming. 1986. Cardiac and ventilatory arousal responses and their habituation in goldfish: Effects of the intensity of the eliciting stimulus. *Physiol. Behav.* **37**(1):11-14.  
{Keys: Heart/ Light/ Ventilation}
671. Rooney, D.J. and P.R. Laming. 1986. Localization of telencephalic regions concerned with habituation of cardiac and ventilatory responses associated with arousal in the goldfish (*Carassius auratus*). *Behav. Neurosci.* **100**(1):45-50.  
{Keys: Brain/ Fright/ Heart/ Light/ Ventilation}
672. Rooney, D.J. and P.R. Laming. 1988. Effects of telencephalic ablation on habituation of arousal responses, within and between daily training sessions in goldfish. *Behav. Neural Biol.* **49**(1):83-96.  
{Keys: Brain/ Heart/ Light/ Ventilation}
673. Ross, L.G. and B. Ross. 1984. *Anaesthetic and Sedative Techniques for Fish*. Institute of Aquaculture, Stirling University, Stirling (UK). 35 pp.  
{Keys: Ventilation}
674. Ross, L.G., K.M.H. Ross and B. Ross. 1985. The effects of formalin, malachite green and suspended solids on the respiratory activity of rainbow trout (*Salmo gairdneri* Richardson). *Aquacult. Fish. Manage.* **16**(2):129-138.  
{Keys: Cough frequency (fc)/ Irritant/ Suspended solids/ Ventilation frequency (fv)/ VO<sub>2</sub>}
675. Rosseland, B.O. 1976. A method for measuring the metabolism, heart rate and respiration rate of an unrestrained fish. *Acta Physiol. Skand.* **96**(3):39A.  
{Keys: Heart frequency (fh)/ Ventilation frequency (fv)}
676. Rovainen, C.M. 1974. Respiratory motoneurons in lampreys. *J. Comp. Physiol.* **94**:57-68.  
{Keys: Nervous system/ Ventilation}
677. Rovainen, C.M. 1977. Neural control of ventilation in the lamprey. *Fed. Proc.* **36**(10):2386-2389.  
{Keys: Brain/ Cough/ Nervous system/ Ventilation}

678. Rovainen, C.M. 1983. Generation of respiratory activity by the lamprey brain exposed to picrotoxin and strychnine, and weak synaptic inhibition in motoneurons. *Neuroscience*. **10**(3):875-882.  
{Keys: Bicululline/ *Ichthyomyzon* sp./ Nervous system/ Picrotoxin/ Strychnine/ Ventilation}
679. Rovainen, C.M. 1985. Respiratory bursts at the midline of the rostral medulla of the lamprey. *J. Comp. Physiol. A*. **157**(3):303-309.  
{Keys: *Ichthyomyzon* sp./ Nervous system/ Ventilation}
680. Roy, P.K. and J.S.D. Munshi. 1988. Oxygen consumption and ventilation rate of a freshwater major carp (*Cirrhinus mrigala* Ham) in fresh and malathion treated waters. *J. Environ. Biol.* **9**(1):5-13.  
{Keys: AChE/ Pesticides/ Ventilation frequency (fv)/ VO<sub>2</sub>}
681. Russell, D.F. 1986. Respiratory pattern generation in adult lampreys (*Lampetra fluviatilis*): Interneurons and burst resetting. *J. Comp. Physiol. A*. **158**(1):91-102.  
{Keys: Nervous system/ Ventilation}
682. Russell, L.C. and M. Fingerman. 1984. Exposure to the water soluble fraction of crude oil or to naphthalenes alters breathing rates of gulf killifish (*Fundulus grandis*). *Bull. Environ. Contam. Toxicol.* **32**(3):363-367.  
{Keys: Brain/ Naphtha/ Ventilation frequency (fv)/ Water soluble fraction}
683. Rutledge, P.S. 1981. Circulation, oxygen transport, and activity in the crayfish. *Am. J. Physiol.* **240**(1):R99-R105.  
{Keys: Heart frequency (fh)/ Invertebrate/ *Pacificus* sp./ pH/ PO<sub>2</sub>/ Ventilation frequency (fv)}
684. Sanderson, S.L. and J.J. Cech Jr. 1995. Particle retention during respiration and particulate feeding in the suspension-feeding blackfish (*Orthodon microlepidotus*). *Can. J. Fish. Aquat. Sci.* **52**(12):2534-2542.  
{Keys: Feed/ Ventilation}
685. Sankaraperumal, G., M.K. Rajan and A. Mohandoss. 1990. Synergistic effect of cadmium and zinc on the erythrocytes and opercular activity of the fishes (*Lepidocephalichthyes thermalis*) and (*Amblypharyngodon melettinus*). *Environ. Ecol.* **8**(4):1213-1216.  
{Keys: Blood/ Cadmium (Cd)/ Metal/ Ventilation/ Zinc (Zn)}

686. Sargent, J.R, M.V. Bell, K.F. Kelly, A.D.F. Johnstone, A.D. Hawkins and C.D. Hall. 1980. Sodium orthovanadate and cardiac activity in teleost fish. *Comp. Biochem. Physiol.* **66C**(1):111-114.  
{Keys: Cod/ EKG/ *Gadus sp.*/ Heart frequency (fh)/ Metal/ *Salmo sp.*/ Trout/ Ventilation frequency (fv)}
687. Sarkar, U.K. and S.K. Konar. 1993. Acute toxicity of mixture of non-ionic detergent akaline FI and pesticide thiodan to fish, plankton and worm. *Environ. Ecol.* **11**(3):630-633.  
{Keys: Cough/ Invertebrate}
688. Satchell, G.H. 1959. Respiratory reflexes in the dogfish. *J. Exp. Biol.* **36**(1):62-71.  
{Keys: Brain/ Gill/ Nerve/ Nervous system/ Ventilation frequency (fv)}
689. Satchell, G.H. 1960. The reflex coordination of the heartbeat with respiration in the dogfish. *J. Exp. Biol.* **37**(4):719-731.  
{Keys: Heart/ Ventilation}
690. Satchell, G.H. 1961. The response of the dogfish to anoxia. *J. Exp. Biol.* **38**:531-543.  
{Keys: Ventilation}
691. Satchell, G.H. and H.K. Way. 1962. Pharyngeal proprioceptors in the dogfish (*Squalus acanthias* L.). *J. Exp. Biol.* **39**:243-250.  
{Keys: Cough/ Ventilation}
692. Satchell, G.H. and D.J. Maddalena. 1972. The cough or expulsion reflex in the Port Jackson shark (*Heterodontus portusjacksoni*). *Comp. Biochem. Physiol.* **41A**:49-62.  
{Keys: Cough/ Electromyogram (EMG)/ Gill/ Ventilation}
693. Satchell, G.H. 1984. Respiratory toxicology of fishes. In: *Aquat. Toxicol.* Vol. 2 (L.J. Weber, ed.), pp. 1-50. Raven Press, New York.  
{Keys: Gill/ Metal/ Pesticides/ Review/ Ventilation}
694. Saunders, R.L. 1961. The irrigation of the gills in fishes. I. Studies of the mechanism of branchial irrigation. *Can. J. Zool.* **39**:637-653.  
{Keys: Buccal/ Bullhead/ Carp/ *Catostomus sp.*/ *Cyprinus sp.*/ *Ictalurus sp.*/ Morphology/ Pressure/ Sucker/ Ventilation/ Video}
695. Saunders, R.L. 1962. The irrigation of gills in fishes. II. Efficiency of oxygen uptake in relation to respiratory flow, activity and concentration of oxygen and carbon dioxide. *Can. J. Zool.* **40**:817-862.  
{Keys: CO<sub>2</sub>/ O<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation}

696. Sawyer, P.L. and A.G. Heath. 1985. Respiratory and cardiac responses of rainbow trout and brown bullhead catfish to waterborne cyanide. *Am. Zool.* **25**(4):A117.  
{Keys: Heart/ Metal/ Ventilation}
697. Sawyer, P.L. and A.G. Heath. 1988. Cardiac, ventilatory and metabolic responses of two ecologically dissimilar species of fish to waterborne cyanide. *Fish Physiol. Biochem.* **4**(4):203-219.  
{Keys: Atropine/ Catfish/ Heart frequency (fh)/ *Ictalurus* sp./ *Salmo* sp./ Trout/ Ventilation frequency (fv)/ VO<sub>2</sub>}
698. Schaumberg, F.D., T.E. Howard and C.C. Walden. 1967. A method to evaluate the effects of water pollutants on fish respiration. *Water Res.* **1**:731-737.  
{Keys: Buccal/ DDT/ Effluent/ Kraft mill effluent/ Pesticides/ Ventilation}
699. Schoettger, R.A. and A.M. Julin. 1969. Efficacy of quinaldine as an anesthetic for seven species of fish. *Investigations in Fish Control:* 22. Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, Washington (D.C.). 8 pp.  
{Keys: Bass/ Bluegill/ Catfish/ Hardness/ pH/ Temperature/ Trout}
700. Schreck, C.B., R.A. Whaley, M.L. Bass, O.E. Maughan and M. Solazzi. 1976. Physiological responses of rainbow trout (*Salmo gairdneri*) to electroshock. *J. Fish. Res. Board Can.* **33**(1):76-84.  
{Keys: Blood/ Buccal/ EKG/ Heart/ Ventilation frequency (fv)}
701. Schwan, T.G. and G.A. Lamberti. 1986. Influence of oxygen concentration on the respiratory behavior of tilapia (*Sarotherodon alcalicus* Graham) in Lake Nakuru, Kenya. *Afr. J. Ecol.* **24**(3):199-202.  
{Keys: O<sub>2</sub>/ Ventilation}
702. Scott, A.L. and W.A. Rogers. 1980. Histological effects of prolonged sublethal hypoxia on channel catfish (*Ictalurus punctatus* Rafinesque). *J. Fish Dis.* **3**:305-316.  
{Keys: Cough/ O<sub>2</sub>/ Ventilation frequency (fv)}
703. Seddiki, H., V. Maxime, G. Boeuf and C. Peyraud. 1995. Effects of growth hormone on plasma ionic regulation, respiration and extracellular acid-base status in trout (*Oncorhynchus mykiss*) transferred to seawater. *Fish Physiol. Biochem.* **14**(4):279-288.  
{Keys: Blood/ PaCO<sub>2</sub>/ Ventilation}
704. Sellers, C.M. Jr., A.G. Heath and M.L. Bass. 1975. The effect of sublethal concentrations of copper and zinc on ventilatory activity, blood oxygen and pH in rainbow trout (*Salmo gairdneri*). *Water Res.* **9**:401-408.  
{Keys: Buccal/ Copper (Cu)/ Cough frequency (fc)/ Metal/ pH/ PO<sub>2</sub>/ Pressure/ Ventilation frequency (fv)/ Zinc (Zn)}

705. Serfaty, A. and R. Raynaud. 1957. Quelques donnees sur l'electrocardiogramme de la tanche (*Tinca tinca* L) en eau douce. *Bull. Soc. Zool. Fr.* **82**:49-56.  
{Keys: EKG/ Ventilation}
706. Servizi, J.A., R.W. Gordon and D.W. Martens. 1969. *Marine disposal of sediments from Bellingham Harbor as related to sockeye and pink salmon fisheries. Toxicity of Sediments. Progress Report No. 23.* International Pacific Salmon Fisheries Commission. 38 pp.  
{Keys: Ventilation}
707. Servizi, J.A. and D.W. Martens. 1991. Effect of temperature, season, and fish size on acute lethality of suspended sediments to coho salmon (*Oncorhynchus kisutch*). *Can. J. Fish. Aquat. Sci.* **48**(3):493-497.  
{Keys: Cough/ LC<sub>50</sub>/ Suspended solids/ Temperature}
708. Servizi, J.A. and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. *Can. J. Fish. Aquat. Sci.* **49**(7):1389-1395.  
{Keys: Avoidance/ Blood/ Cough frequency (fc)/ Suspended solids}
709. Shea, T.B. and E.S. Berry. 1983. Toxicity of carbaryl and 1-naphthol to goldfish (*Carassius auratus*) and killifish (*Fundulus heteroclitus*). *Bull. Environ. Contam. Toxicol.* **31**(5):526-529.  
{Keys: AChE/ Pesticides}
710. Shelton, G. 1959. The respiratory centre in the tench (*Tinca tinca*). I. The effects of brain transections on respiration. *J. Exp. Biol.* **36**:191-202.  
Keys: Anesthetic/ Brain transection/ Cough/ Nerve/ Nervous system/ Urethane/ Ventilation}
711. Shelton, G. 1961. The respiratory centre in the tench (*Tinca tinca* L.). II. Respiratory neuronal activity in the medulla oblongata. *J. Exp. Biol.* **38**:79-92.  
{Keys: Brain/ Nervous system/ Ventilation}
712. Shelton, G. and D.J. Randall. 1962. The relationship between heart beat and respiration in teleost fish. *Comp. Biochem. Physiol.* **7**:237-250.  
{Keys: Anesthetic/ Heart frequency (fh)/ MS<sub>222</sub>/ Ventilation}
713. Shelton, G. 1970. The regulation of breathing. In: *Fish Physiology*, Vol. 4 (W.S. Hoar and D.J. Randall, eds.), pp. 293-359. Academic Press, New York.  
{Keys: Ventilation}

714. Short, S., E.W. Taylor and P.J. Butler. 1979. The effectiveness of oxygen transfer during normoxia and hypoxia in the dogfish (*Scyliorhinus canicula* L) before and after cardiac vagotomy. *J. Comp. Physiol.* **132**:289-295.  
{Keys: Blood/ Heart/ Nerve/ Nervous system/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>}
715. Shparkovskii, I.A. 1983. Effect of DDT on vegetation processes in cod. *Sov. J. Mar. Biol.* **8**(5):285-289. [Translation of *Biol. Morya.* **5**:59-64].  
{Keys: EKG/ Electromyogram (EMG)/ *Gadus sp.*/ Heart/ Nervous system/ Pesticides/ Ventilation}
716. Silbergeld, E.K. 1973. Dieldrin effects of chronic sublethal exposure on adaptation to thermal stress in freshwater fish. *Environ. Sci. Technol.* **7**(9):846-849.  
{Keys: Cyclodiene/ Pesticides/ Temperature/ Ventilation}
717. Singh, A. 1994. Oxygen consumption and ventilation rate in (*Channa punctatus* Bloch) exposed to sublethal levels of mercuric chloride. *Environ. Ecol.* **12**(2):252-255.  
{Keys: Mercury (Hg)/ Metal/ Ventilation/ VO<sub>2</sub>}
718. Singh, B.R. 1972. Branchial muscles and their working in some fresh-water teleosts. *Indian J. Zootomy.* **13**(1):3-13.  
{Keys: Cough/ Gill/ *Glossogobius sp.*/ Ventilation/ *Lepomis sp.*/ *Xenendtodon sp.*}
719. Sinhaseni, P., L.G. D'Alecy, R. Hartung and M. Shlafer. 1983. Respiratory effects of hexachlorocyclopentadiene on intact rainbow trout (*Salmo gairdneri*) and on oxidative phosphorylation of isolated trout heart mitochondria. *Toxicol. App Pharmacol.* **67**(2):215-223.  
{Keys: Uncoupler/ Ventilation}
720. Skidmore, J.F. 1964. Toxicity of zinc compounds to aquatic animals, with special reference to fish. *Q. Rev. Biol.* **39**(3):227-248.  
{Keys: Metal/ Ventilation/ Zinc (Zn)}
721. Skidmore, J.F. 1970. Respiration and osmoregulation in rainbow trout with gills damaged by zinc sulphate. *J. Exp. Biol.* **52**:481-494.  
{Keys: Blood/ Cough/ Gill damage/ Heart/ Hypoxia/ Metal/ PaO<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation volume (VG)/ VO<sub>2</sub>/ Zinc (Zn)}
722. Skidmore, J.F. and P.W.A. Tovell. 1972. Toxic effects of zinc sulphate on the gills of rainbow trout. *Water Res.* **6**:217-230.  
{Keys: Metal/ Ventilation/ Zinc (Zn)}

723. Sliger, W.A. 1975. *An evaluation of bioassay methods for determining acute phenol toxicity to channel catfish (*Ictalurus punctatus* Rafinesque)*. Ph.D. Thesis. Oklahoma State University. 73 pp.  
{Keys: Bluegill/ Phenol/ Ventilation frequency (fv)}
724. Slooff, W. 1979. Detection limits of a biological monitoring system based on fish respiration. *Bull. Environ. Contam. Toxicol.* **23**:517-523.  
Keys: Acrylonitrile/ Anesthetic/ Benzene/ *Brachydanio* sp./ Butadiene/ Cadmium (Cd)/ Chloroform/ Copper (Cu)/ Cyanide/ External electrodes/ Hexane/ LC<sub>50</sub>/ PCP/ Phenol/ *Salmo* sp./ Toluene/ Trichloroethylene (TCE)/ Trout/ Ventilation/ Xylene}
725. Slooff, W., D. de Zwart and J.M. Marquenie. 1983. Detection limits of a biological monitoring system for chemical water pollution based on mussel activity. *Bull. Environ. Contam. Toxicol.* **30**(4):400-405.  
{Keys: *Dreissena* sp./ Invertebrate/ Ventilation}
726. Smart, G.R. 1978. Investigations of the toxic mechanisms of ammonia to fish gas exchange in rainbow trout (*Salmo gairdneri*) exposed to acutely lethal concentrations. *J. Fish Biol.* **12**:93-104.  
{Keys: Blood/ Cough frequency (fc)/ Heart frequency (fh)/ PaO<sub>2</sub>/ Ventilation frequency (fv)/ Ventilation volume (VG)/ VO<sub>2</sub>}
727. Smatresk, N.J. and J.N. Cameron. 1982. Respiration and acid-base physiology of the spotted gar, a bimodal breather. I. Normal values and the response to severe hypoxia. *J. Exp. Biol.* **96**:262-280.  
{Keys: Air breathing/ Heart/ Ventilation}
728. Smatresk, N.J. and J.N. Cameron. 1982. Respiration and acid-base physiology of the spotted gar, a bimodal breather. II. Responses to temperature change and hypercapnia. *J. Exp. Biol.* **96**:281-293.  
{Keys: Air breathing/ Blood/ CO<sub>2</sub>/ Temperature/ Ventilation/ VO<sub>2</sub>}
729. Smatresk, N.J. and J.N. Cameron. 1982. Respiration and acid-base physiology of the spotted gar, a bimodal breather. III. Response to a transfer from freshwater to 50% seawater, and control of ventilation. *J. Exp. Biol.* **96**:295-306.  
{Keys: Air breathing/ Blood/ *Lepisosteus* sp./ Seawater/ Ventilation}
730. Smatresk, N.J. 1986. Ventilatory and cardiac reflex responses to hypoxia and NaCN in *Lepisosteus osseus*, an air-breathing fish. *Physiol. Zool.* **59**(4):385-397.  
{Keys: Cyanide/ Heart/ Metal/ Ventilation}

731. Smatresk, N.J., M.L. Burleson and S.Q. Azizi. 1986. Chemoreflexive responses to hypoxia and NaCN in longnose gar: Evidence for two chemoreceptor loci. *Am. J. Physiol. (Regulatory Integrative Comp. Physiol.* 20). **251**:R116-R125.  
{Keys: Cyanide/ Metal/ Ventilation}
732. Smit, G.L. and J. Hattingh. 1979. Anesthetic potency of MS<sub>222</sub> and neutralized MS<sub>222</sub> as studied in three freshwater fish species. *Comp. Biochem. Physiol.* **62C**:237-247.  
{Keys: Anesthetic/ Blood/ Carp/ *Cyprinus sp.*/ MS<sub>222</sub>/ *Salmo sp.*/ *Sarotherodon sp.*/ Trout/ Ventilation}
733. Smith, F.M. and D.R. Jones. 1978. Localization of receptors causing hypoxic bradycardia in trout (*Salmo gairdneri*). *Can. J. Zool.* **56**:1260-1265.  
{Keys: Blood/ Heart frequency (fh)/ Hypoxia/ Nerve/ Nervous system/ PaO<sub>2</sub>/ PO<sub>2</sub>/ Temperature/ Ventilation frequency (fv)}
734. Smith, F.M. and D.R. Jones. 1982. The effect of changes in blood oxygen carrying capacity on ventilation volume in the rainbow trout (*Salmo gairdneri*). *J. Exp. Biol.* **97**:325-334.
735. Smith, J.R. 1984. Fish neurotoxicology. In: *Aquatic Toxicology* (L.J. Weber, ed.), pp. 107-151. Raven Press, New York.  
{Keys: Brain/ Nerve/ Review/ Ventilation}
736. Smith, L.S. and G.R. Bell. 1967. Anesthetic and surgical techniques for Pacific salmon. *J. Fish. Res. Board Can.* **24**(7):1579-1588.  
{Keys: Ventilation}
737. Smith, R.S. and D.L. Kramer. 1986. The effect of apparent predation risk on the respiratory behavior of the Florida gar (*Lepisosteus platyrhincus*). *Can. J. Zool.* **64**(10):2133-2136.  
{Keys: Air breathing/ Predator/ Ventilation}
738. Solbe, J.F. de L.G. 1979. Studies on the effects of pollution on freshwater fish. In: *Biological Aspects of Freshwater Pollution. Proceedings of a Course Held at Joint Research Centre of the Commission of European Communities. 5-9 June 1978. Ispra, Italy* (O. Ravera, ed.), pp. 1-18. Pergamon Press, Oxford (UK).  
{Keys: Cough frequency (fc)/ Ventilation frequency (fv)}
739. Solman, A. 1980. In-situ water quality monitoring using trout in the U.K. In: *Proceedings of 2nd Interagency Workshop on In-situ Water-Quality Sensing: Biological Sensors. 28-30 April 1980. Pensacola (FL)* (E.D. Kennedy, ed.), pp. 207. NOAA/ National Marine Pollution Program Office, Rockville (MD).  
{Keys: External electrodes/ Heart frequency (fh)/ Ventilation frequency (fv)}

740. Sorenson, E.M.B. and R.D. Burkett. 1978. Respiratory responses to instant thermal stress under oxygen-enriched conditions in centrarchids. *Tex. J. Sci.* **30**(4):337-345.  
{Keys: Bass/ *Lepomis* sp./ *Micropterus* sp./ Sunfish/ Ventilation frequency (fv)/ Visual}
741. Sparks, R.E., A.G. Heath and J. Cairns Jr. 1969. Changes in bluegill EKG and respiratory signal caused by exposure to concentrations of zinc. *Assoc. SE Biol. Bull.* **16**(2):69.  
{Keys: EKG/ Metal/ Ventilation/ Zinc (Zn)}
742. Sparks, R.E. and J. Cairns Jr. 1972. The response of bluegill sunfish (*Lepomis macrochirus*) to seismic shock. *Hydrobiologia*. **39**:273-276.  
{Keys: Seismic/ Ventilation}
743. Sparks, R.E., J. Cairns Jr. and A.G. Heath. 1972. The use of bluegill breathing rates to detect zinc. *Water Res.* **6**:895-911.  
{Keys: External electrodes/ *Lepomis* sp./ Metal/ Ventilation frequency (fv)/ Zinc (Zn)}
744. Sparks, R.E., J. Cairns Jr., R.A. McNabb and G. Suter II. 1972. Monitoring zinc concentrations in water using the respiratory response of bluegills (*Lepomis macrochirus* Raf). *Hydrobiologia*. **40**(3):361-369.  
{Keys: Anesthetic/ Buccal/ Cough/ Metal/ MS<sub>222</sub>/ Pressure/ Ventilation/ Zinc (Zn)}
745. Spitzer, K.W., D.E. Marvin and A.G. Heath. 1969. The effect of temperature on the respiratory and cardiac response of the bluegill sunfish to hypoxia. *Comp. Biochem. Physiol.* **30**:83-90.  
{Keys: Heart frequency (fh)/ O<sub>2</sub>/ Temperature/ Ventilation frequency (fv)/ VO<sub>2</sub>}
746. Spoor, W.A., T.W. Neiheisel and R.A. Drummond. 1971. An electrode chamber for recording respiratory and other movements of free-swimming animals. *Trans. Am. Fish. Soc.* **100**:22-28.  
{Keys: Activity/ Cough/ External electrodes/ Ventilation}
747. Spoor, W.A. and R.A. Drummond. 1972. An electrode for detecting movement in gradient tanks. *Trans. Am. Fish. Soc.* **101**(4):714-715.  
{Keys: Behavior/ External electrodes/ Ventilation}
748. Sprague, J.B. 1964. Avoidance of copper-zinc solutions by young salmon in the laboratory. *J. Water Pollut. Control Fed.* **36**(8):990-1004.  
{Keys: Avoidance/ Behavior/ Copper (Cu)/ Cough/ Metal/ Ventilation/ Zinc (Zn)}

749. Stafford, C.L. and J.A. Ward. 1983. Effects of monochloramine on courtship and spawning in the cichlid fish *Etropus maculatus*. In: *Predators and Prey in Fishes* (D.L.G. Noakes et al., eds), pp. 213-220. Dr. W. Junk Publishers, The Hague (Netherlands).  
 {Keys: Chlorine (Cl)/ Cough}
750. Stasko, A.B. and D.G. Pincock. 1977. Review of underwater biotelemetry, with emphasis on ultrasonic techniques. *J. Fish. Res. Board Can.* **34**(9):1261-1285.  
 {Keys: Telemetry/ Ventilation}
751. Steele, C.M., D.W. Owens, A. Scarfe and P. Thomas. 1985. Behavioral assessment of the sublethal effects of aquatic pollution (Review). *Mar. Pollut. Biol.* **16**(6):221-224.  
 {Keys: Review/ Ventilation}
752. Steen, J.B. and A. Kruysse. 1964. The respiratory function of teleostean gills. *Comp. Biochem. Physiol.* **12**:127-142.  
 {Keys: Ventilation}
753. Steffensen, J.F., J.P. Lomholt and K. Johansen. 1982. Gill ventilation and O<sub>2</sub> extraction during graded hypoxia in two ecologically distinct species of flatfish, the flounder (*Platichthys flesus*) and the plaice (*Pleuronectes platessa*). *Environ. Biol. Fishes* **7**(2):157-163.  
 {Keys: O<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation frequency (fv)/ Ventilation volume (VG)/ VO<sub>2</sub>}
754. Steffensen, J.F. and J.P. Lomholt. 1983. Energetic cost of active branchial ventilation in the sharksucker (*Echeneis naucrates*). *J. Exp. Biol.* **103**:185-192.  
 {Keys: Bioenergetic/ Ventilation/ VO<sub>2</sub>}
755. Steffensen, J.F., K. Johansen, C.D. Sindberg and J.H. Sorensen. 1984. Ventilation and oxygen consumption in the hagfish (*Myxine glutinosa* L.). *J. Exp. Mar. Biol. Ecol.* **84**(2):173-178.  
 {Keys: Temperature/ Ventilation frequency (fv)/ VO<sub>2</sub>}
756. Steffensen, J.F. 1985. The transition between branchial pumping and ram ventilation in fishes: Energetic consequences and dependence on water oxygen tension. *J. Exp. Biol.* **114**:141-150.  
 {Keys: O<sub>2</sub>/ *Salmo* sp./ Ram ventilation/ Shark/ Trout/ Ventilation/ VO<sub>2</sub>}
757. Stevens, E.D. and D.J. Randall. 1967. Changes in blood pressure, heart rate and breathing rate during moderate swimming activity in rainbow trout. *J. Exp. Biol.* **46**:307-315.  
 {Keys: Blood pressure/ Heart frequency (fh)/ Ventilation frequency (fv)}

758. Stevens, E.D. and D.J. Randall. 1967. Changes of gas concentrations in blood and water during moderate swimming activity in rainbow trout. *J. Exp. Biol.* **46**:329-337.  
{Keys: Swimming/ Ventilation}
759. Stillwell, E.J. and T.J. Benfey. 1996. Hemoglobin level, metabolic rate, opercular abduction rate and swimming efficiency in female triploid brook trout (*Salvelinus fontinalis*). *Fish Physiol. Biochem.* **15**(5):377-384.  
{Keys: Genetic/ Hemoglobin/ Swimming/ Ventilation}
760. Stoner, A.W. and R.J. Livingston. 1978. Respiration, growth and food conversion efficiency of pinfish (*Lagodon rhomboides*) exposed to sublethal concentrations of bleached kraft mill effluent. *Environ. Pollut.* **17**(3):207-217.  
{Keys: Bleached kraft mill effluent/ Feed/ Growth/ Metabolism/ Seawater/ Ventilation frequency (fv)/ Visual}
761. Strange, J.R., J.W. Dean, G.K. Dorman and D.J. Fletcher. 1975. New method for recording heart and respiratory rates in catfish. *Sci. Biol.* **1**(1):17-18.  
{Keys: Heart/ Ventilation}
762. Strange, J.R., D.J. Fletcher and P.M. Allred. 1978. Cardiac and opercular responses in channel catfish (*Ictalurus punctatus*) exposed to high levels of phosphate. *J. Environ. Sci. Health.* **13A**(7):501-515.  
{Keys: Cough/ Heart/ Ventilation}
763. Streit, B., E.O. Sire, G.H. Kohlmaier, F.W. Badeck and S. Winter. 1991. Modeling ventilation efficiency of teleost fish gills for pollutants with high affinity to plasma proteins. *Ecol. Model.* **57**(3-4):237-262.  
{Keys: Blood binding/ Plasma/ Protein/ Uptake efficiency (UE)}
764. Sumner, F.B. and N.A. Wells. 1935. Some relations between respiratory metabolism in fishes and susceptibility to certain anesthetics and lethal agents. *Biol. Bull.* **69**:368-378.  
{Keys: Chloretone/ Cyanide/ Ether/ Hypoxia/ Urethane/ Ventilation}
765. Sutterlin, A.M. 1969. Effects of exercise on cardiac and ventilation frequency in three species of freshwater teleosts. *Physiol. Zool.* **42**:36-52.  
{Keys: Attached electrodes/ Bullhead/ Exercise/ Heart frequency (fh)/ *Ictalurus sp.* / *Lepomis sp.*/ *Salmo sp.*/ Sunfish/ Trout/ Ventilation frequency (fv)}
766. Sutterlin, A.M. and R.L. Saunders. 1969. Proprioceptors in the gills of teleosts. *Can. J. Zool.* **47**:1209.  
{Keys: Nerve/ Nervous system/ Ventilation}

767. Swain, W.R., R.M. Wilson and R.P. Neri. 1975. Studies on the effects of thermal addition on selected zooplankton populations. *Water Resources Research Center (WRRC) Bulletin No. 84*. University of Minnesota Graduate School.  
{Keys: Invertebrate/ Technique/ Ventilation/ VO<sub>2</sub>}
768. Swain, W.R., R.M. Wilson, R.P. Neri and G.S. Porter. 1977. A new technique for remote monitoring of activity of freshwater invertebrates with special reference to oxygen consumption by naiades (*Anax*) and (*Somatochlora Odonata*). *Can. Ent.* **109**(1):1-8.  
{Keys: Invertebrate/ Ventilation/ VO<sub>2</sub>}
769. Swedmark, M., B. Braaten, E. Emanuelsson and A. Granmo. 1971. Biological effects of surface active agents on marine animals. *Mar. Biol.* **9**:183-201.  
{Keys: ABS surfactant/ Activity/ *Astarte sp.*/ Avoidance/ *Cardium sp.*/ Crustacean/ LC<sub>50</sub>/ *Leander sp.*/LES surfactant/ *Mya sp.*/ *Mytilus sp.*/ NP<sub>10</sub>EO surfactant/ TAE<sub>10</sub>EO surfactant/ Ventilation frequency (fv)}
770. Sydor, W.J., W.R. Miller III., J. Cairns Jr. and D. Gruber. 1982. Use of box and line plots to assess fish ventilatory behavior in biological monitoring systems. *Can. J. Fish. Aquat. Sci.* **39**:1719-1722.  
{Keys: Bluegill/ Chlorine (Cl)/ Effluent/ External electrodes/ Irritant/ *Lepomis sp.*/ Nitroglycerine/ Ventilation}
771. Taylor, E.W. and M.G. Wheatly. 1981. The effect of long-term aerial exposure on heart rate, ventilation, respiratory gas exchange and acid-base status in the crayfish (*Austropotamobius pallipes*). *J. Exp. Biol.* **92**(6):109-124.  
{Keys: Blood/ Heart frequency (fh)/ Invertebrate/ PaO<sub>2</sub>/ Ventilation frequency (fv)/ VO<sub>2</sub>}
772. Taylor, E.W. and P.J. Butler. 1982. Nervous control of heart rate: Activity in the cardiac vagus of the dogfish. *J. Appl. Physiol.: Respir. Environ. Exercise Physiol.* **53**(6):1330-1335.  
{Keys: Blood/ Heart frequency (fh)/ Hypoxia/ Nerve/ Nervous system/ Ventilation frequency (fv)}
773. Taylor, E.W. and D.J. Barrett. 1985. Evidence of a respiratory role for the hypoxic bradycardia in the dogfish (*Scyliorhinus canicula* L.). *Comp. Biochem. Physiol.* **80A**(1):99-102.  
{Keys: Heart frequency (fh)/ Hypoxia/ O<sub>2</sub>/ Ventilation}
774. Taylor, E.W., A.H. Houston and J.D. Horgan. 1968. Development of a computer model simulating some aspects of the cardiovascular-respiratory dynamics of the salmonid fish. *J. Exp. Biol.* **49**:477-493.  
{Keys: Heart/ Model/ Ventilation}

775. Thienpont, D. and C.J.E. Niemegeers. 1965. Propoxate (R7464): A new potent anesthetic agent in cold-blooded vertebrates. *Nature*. **205**:1018-1019.  
{Keys: Ventilation}
776. Thomas, R.E. and S.D. Rice. 1975. Increased opercular rates of pink salmon (*Oncorhynchus gorbuscha*) fry after exposure to the water-soluble fraction of Prudhoe Bay crude oil. *J. Fish. Res. Board Can.* **32**:2221-2224.  
{Keys: Ventilation frequency (fv)/ Water soluble fraction}
777. Thomas, R.E. and S.D. Rice. 1979. The effect of exposure temperatures on oxygen consumption and opercular breathing rates of pink salmon fry exposed to toluene, naphthalene, and water-soluble fractions of Cook Inlet crude oil and no. 2 fuel oil. In: *Marine Pollution: Functional Responses. Proceedings of the Symposium Pollution and Physiology of Marine Organisms* (W. Vernberg, A. Calabrese, F.P. Thurberg and F.J. Vernberg, eds.), pp. 39-52. Academic Press, New York.  
{Keys: Temperature/ Ventilation/ VO<sub>2</sub>/ Water soluble fraction}
778. Thomas, S., B. Fievet, L. Barthelemy and C. Peyraud. 1983. Comparison of the effects of exogenous and endogenous hypercapnia on ventilation and oxygen uptake in the rainbow trout (*Salmo gairdneri* R.). *J. Comp. Physiol.* **151**(2):185-190.  
{Keys: CO<sub>2</sub>/ O<sub>2</sub>/ Uptake efficiency (UE)/ Ventilation frequency (fv)/ VO<sub>2</sub>}
779. Thompson, K.W., K.L. Dickson, D. Hooley, J. Cairns Jr. and W.H. van der Schalie. 1978. A computer monitored aquatic bioassay system. In: *Proceeding of Tenth Mid-Atlantic Industrial Waste Conference* (J.B. Carberry, ed.), pp. 61-66. University of Delaware Press.  
{Keys: Bioassay/ Bluegill/ Data acquisition/ External electrodes/ *Lepomis* sp./ Metal/ Ventilation/ Zinc (Zn)}
780. Thompson, K.W., M.L. Deaton, R.V. Foutz, J. Cairns Jr. and A.C. Hendricks. 1982. Application of time-series intervention analysis to fish ventilatory response data. *Can. J. Fish.* **39**:518-521.  
{Keys: Bluegill/ External electrodes/ *Lepomis* sp./ Metal/ Ventilation/ Zinc (Zn)}
781. Thompson, K.W., A.C. Hendricks, G.L. Nunn and J. Cairns Jr. 1983. Ventilatory responses of bluegill sunfish to sublethal fluctuating exposures to heavy metals (Zn++ and Cu++). *Water Resour. Bull.* **19**(5):719-728.  
{Keys: Copper (Cu)/ External electrodes/ *Lepomis* sp./ Metal/ Ventilation volume (VG)/ Zinc (Zn)}
782. Todd, E.S. 1971. Respiratory control in the longjaw mudsucker (*Gillichthys mirabilis*). *Comp. Biochem. Physiol.* **39A**(1):147-163.  
{Keys: Air breathing/ CO<sub>2</sub>/ Goby/ O<sub>2</sub>/ Ventilation/ VO<sub>2</sub>}

783. Tokamaru, M., P.V. Ngan, I. Hanyu and T. Hibiya. 1979. Physiopathological studies on the effects of cadmium on fish. 1. Effects of cadmium on the functions of respiratory and circulatory systems of carp (*Cyprinus carpio* L Dusenia). **11**(1):1-8.  
{Keys: Blood pressure/ Cadmium (Cd)/ Heart frequency (fh)/ Metal/ Ventilation}
784. Torrans, E.L. and H.P. Clemens. 1982. Physiological and biochemical effects of acute exposure of fish to hydrogen sulfide. *Comp. Biochem. Physiol.* **71C**(2):183-190.  
{Keys: Blood/ Brain/ Catfish/ H<sub>2</sub>S/ Nervous system/ Ventilation}
785. Tortorelli, M.C., D.A. Hernandez, G.R. Vazquez and A. Salibian. 1990. Effects of paraquat on mortality and cardiorespiratory function of catfish fry *Plecostomus commersoni*. *Arch. Environ. Contam. Toxicol.* **19**(4):523-529.  
{Keys: Gill/ Heart/ Morphology/ Pesticides/ Ventilation frequency (fv)}
786. Travis, T.W. and A.G. Heath. 1981. Some physiological responses of rainbow trout (*Salmo gairdneri*) to intermittent monochloramine exposure. *Water Res.* **15**:977-82.  
{Keys: Blood/ Chlorine (Cl)/ Cough frequency (fc)/ Heart frequency (fh)/ Irritant/ PaO<sub>2</sub>/ Ventilation}
787. Tubb, R.A. 1982. Use of fish ventilation frequency to estimate chronically safe toxicant concentrations. *EPA-600 J-82-225*. CERL, Corvallis (OR). 9 pp.  
{Keys: Hardness/ Metal/ *Salmo* sp./ Temperature/ Trout/ Ventilation frequency (fv)/ Zinc (Zn)}
788. Ufodike, E.B.C. and E. Omorogie. 1994. Acute toxicity of water extracts of barks of *Balanites aegyptiaca* and *Kigelia africana* to *Oreochromis niloticus* (L.). *Aquacult. Fish Manage.* **25**(9):873-879.  
{Keys: LC<sub>50</sub>/ Tree bark extracts/ Ventilation}
789. Umezawa, S.I. and H. Watanabe. 1973. On the respiration of the killifish (*Oryzias latipes*). *J. Exp. Biol.* **58**:305-325.  
{Keys: External electrodes/ Ventilation}
790. Umezawa, S.I., K. Ishida and M. Inoue. 1979. Effect of surfactants on the fish. *Rep. Usa Mar. Biol. Inst. Kochi Univ.* No 1:65-78. [Japanese].  
{Keys: Gill/ Goby/ Medaka/ Uptake efficiency (UE)/ Ventilation frequency (fv)/ VO<sub>2</sub>}
791. Umezawa, S.I. and H. Watanabe. 1979. Group effect on the respiration of the medaka (*Oryzias latipes*). *Jpn. J. Ichthyol.* **26**(3):266-272.  
{Keys: External electrodes/ Ventilation/ VO<sub>2</sub>}

792. Umezawa, S.I. and G.M. Hughes. 1983. Effects of water flow and hypoxia on respiration of the frogfishes (*Histrio histrio*) and (*Phrynelox tridens*). *Jpn. J. Ichthyol.* **29**(4):421-428.  
{Keys: Uptake efficiency (UE)/ Ventilation/ VO<sub>2</sub>}
793. Upadhyaya, A. and K.S. Rao. 1980. Acute toxicity of tafazine to fish. *Int. J. Environ. Stud.* **15**(3):236-238.  
{Keys: Pesticides/ Tilapia/ Ventilation}
794. Van Dam, L. 1938. *On the utilization of oxygen and regulation of breathing in some aquatic animals*. Ph.D. Thesis. University of Groningen, Groningen (The Netherlands). 143 pp.  
{Keys: Ventilation}
795. van der Putte, I., M.B.H.M. Laurier and G.J.M. van Eijk. 1982. Respiration and osmoregulation in rainbow trout (*Salmo gairdneri*) exposed to hexavalent chromium at different pH values. *Aquat. Toxicol.* **2**:99-112.  
{Keys: Blood/ Chromium (Cr)/ Cough frequency (fc)/ Metal/ pH/ Ventilation frequency (fv)}
796. van der Schalie, W.H. and G.F. Westlake. 1975. An improved technique for automatically recording respiration in fish. *Assoc. Southeast Biol. Bull.* **22**(2):84-85.  
{Keys: Ventilation}
797. van der Schalie, W.H. 1977. *The utilization of aquatic organisms for continuous and automatic monitoring of the toxicity of industrial waste effluents*. Ph.D. Thesis. Virginia Polytechnic Institute and State University, Blacksburg (VA). 167 pp.  
{Keys: Ventilation}
798. van der Schalie, W.H., K.L. Dickson, G.F. Westlake and J. Cairns Jr. 1979. Fish bioassay monitoring of waste effluents. *Environ. Manage.* **3**:217-235.  
{Keys: Bluegill/ Ventilation}
799. van der Schalie, W.H. 1980. A new technique for automatic monitoring of fish ventilatory patterns and its possible use in screening tests for chronic toxicity. In: *Aquatic Toxicology. Proceedings of the 3rd Annual Symposium on Aquatic Toxicology. ASTM STP 707* (J.G. Eaton, P.R. Parrish and A.C. Hendricks, eds.), pp. 233-242. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Activity/ Bluegill/ Cough/ Ventilation}

800. van der Schalie, W.H. 1986. Can biological monitoring early warning systems be useful in detecting toxic materials in water. In: *Aquatic Toxicology and Environmental Fate: Ninth Volume. ASTM STP 921* (T.M. Poston and R. Purdy, eds.), pp. 107-121. American Society for Testing and Materials, Philadelphia (PA). {Keys: Ventilation}
801. van der Schalie, W.H., T.R. Shedd and M.G. Zeeman. 1988. Ventilatory and movement responses of bluegills exposed to 1, 3, 5-trinitrobenzene. In: *Aquatic Toxicology and Hazard Assessment: 10th Volume. ASTM STP 971* (W.J. Adams, G.A. Chapman and W.G. Landis, eds.), pp. 307-315. American Society for Testing and Materials, Philadelphia (PA). {Keys: Bluegill/ Trinitrobenzene/ Ventilation}
802. Vandewalle, P. 1979. Cinematographic and electromyographic study of respiratory movements of three cyprinids. [Etude cinematographique et electromyographique des mouvements respiratoires chez trois cyprins (*Gobio gobio* L), (*Barbus barbus* L), et (*Leuciscus leuciscus* L)]. *Cybium 3e serie.* 6:3-28. [French]. {Keys: Cine/ Morphology/ Ventilation}
803. Vandewalle, P. 1980. The electromyographic and cinematographic study of coughing in three cyprinids. [Etude cinematographique et electromyographique de la toux chez trois cyprins, *Gobio gobio* (L.), *Barbus barbus* (L.) et *Leuciscus leuciscus* (L.)]. *Cybium 3e serie.* 9:5-17. {Keys: Cine/ Cough/ Morphology/ Ventilation}
804. Van Rooij, J.M. and J.J. Videler. 1996. Estimating oxygen uptake rate from ventilation frequency in the reef fish (*Sparisoma viride*). *Mar. Ecol. Prog. Ser.* 132(1-3):31-41. {Keys: Metabolism/ O<sub>2</sub>/ Parrotfish/ Respirometry/ Ventilation frequency (fv)/ VO<sub>2</sub>}
805. Veith, G.D., D.J. Call and L.T. Brooke. 1983. Structure-toxicity relationships for the fathead minnow (*Pimephales promelas*): Narcotic industrial chemicals. *EPA-600 J-83-070*. National Technical Information Service, Springfield (VA). 8 pp. {Keys: Anesthetic/ Fathead minnow/ Structure activity}
806. Venables, B.J. and L.C. Fitzpatrick. 1973. Effect of rapid temperature increase on the opercular and O<sub>2</sub> consumption rates of the largemouth black bass (*Micropterus salmoides*). *Am. Zool.* 123:201. {Keys: Temperature/ Ventilation frequency (fv)/ VO<sub>2</sub>}
807. Venables, B.J. and E.N. Smith. 1972. A simple method for recording opercular and heart rate of unrestrained fish. *Prog. Fish Cult.* 34(4):233-234. {Keys: Heart rate/ Ventilation}

808. Verma, S.R., S.K. Bansal and R.C. Dalela. 1977. Bioassay trials with a few organic biocides on fresh water fish (*Labeo rohita*). *Indian J. Environ. Health.* **19**(2):107-115.  
{Keys: Chlordane/ Cyclodiene/ Ekalaux/ Ekatin/ Organochlor/ Organophosphorus/ Pesticides/ Sumithion/ TL<sub>50</sub>/ Ventilation}
809. Verma, S.R., S.K. Bansal and R.C. Dalela. 1978. Toxicity of selected organic pesticides to a freshwater teleost fish, *Saccobranchus fossilis* and its application in controlling water pollution. *Arch. Environ. Contam. Toxicol.* **7**(3):317-323.  
{Keys: Chlordane/ Organochlor/ Organophosphorus/ Pesticides/ Sumithion}
810. Verma, S.R., S.K. Bansal, A.K. Gupta, N. Pal, A.K. Tyagi, M.C. Bhatnagar, V. Kumar and R.C. Dalela. 1982. Bioassay trials with twenty-three pesticides to a fresh water teleost (*Saccobranchus fossilis*). *Water Res.* **16**(5):525-529.  
{Keys: Abate/ Aldrin/ BHC/ Carbamate/ Carbaryl (Sevin)/ Carbofuran/ Chlordane/ Cyclodiene/ DDVP/ Diazinon/ Dipterex/ Ekalux/ Ekatin/ Endosulfan/ Formothion/ Heptachlor/ LC<sub>50</sub>/ Lindane/ Malathion/ Malatox/ Metasystox/ Organochlor/ Organophosphorus/ Pesticides/ Phosvel/ Rogor/ Sumithion/ Thiotox/ Ventilation/ Zolone}
811. Viertel, B. 1990. Suspension feeding of anuran larvae at low concentrations of chlorella algae (*Amphibia anura*). *Oecologia*. **85**(2):167-177.  
{Keys: Feed/ Ventilation}
812. Vinegar, A. and R.E. Davis. 1972. Branchial ventilation rates of catoptic goldfish (*Carassius auratus*) and effects of light and electrical shock. *Physiol. Behav.* **8**:417-520.  
{Keys: Light/ Shock/ Ventilation}
813. Von Holst, E. 1934. Reflex und Rhythmus im Goldfischruckenmark. *Zool. Anz.* (Suppl.7):93-95.  
{Keys: Ventilation}
814. Von Holst, E. 1934 Studien über Reflex und Rhythmen beim Goldfisch (*Carassius auratus*). *Z. Vgl. Physiol.* **20**:582-599.  
{Keys: Ventilation}
815. Waiwood, K.G. and P.H. Johansen. 1974. Oxygen consumption and activity of the white sucker (*Catostomus commersoni*) in lethal and non-lethal levels of the organochlorine insecticide, methoxychlor. *Water Res.* **8**:401-406.  
{Keys: Pesticides/ Ventilation/ VO<sub>2</sub>}

816. Walden, C.C., T.E. Howard and G.C. Froud. 1970. A quantitative assay of the minimum concentrations of kraft mill effluents which affect fish respiration. *Water Res.* **4**:61-68.  
{Keys: Anesthetic/ Buccal/ Cough frequency (fc)/ MS<sub>222</sub>/ Temperature/ Ventilation frequency (fv)}
817. Walden, C.C. 1976. Review paper: The toxicity of pulp and paper mill effluents and corresponding measurement procedures. *Water Res.* **10**:639-664.  
{Keys: Ventilation}
818. Waldichuk, M. 1979. Review of the pollution problems. *Philos. Trans. R. Soc. Lond.* **286**:399-424.  
{Keys: Ventilation}
819. Waldron, I. 1972. Spatial organization of respiratory neurons in the medulla of tench and goldfish. *J. Exp. Biol.* **57**:449-459.  
{Keys: Brain/ Ventilation}
820. Walker, R.L., C.M. Wood and H.L. Bergman. 1991. Effects of long-term preexposure to sublethal concentrations of acid and aluminum on the ventilatory response to aluminum challenge in brook trout (*Salvelinus fontinalis*). *Can. J. Fish. Aquat. Sci.* **48**(10):1989-1995.  
{Keys: Aluminum (Al)/ Blood/ Metal/ PaCO<sub>2</sub>/ PaO<sub>2</sub>/ Ventilation volume (VG)}
821. Wares, W.D., II and R. Ingram. 1979. Oxygen consumption in the fathead minnow (*Pimephales promelas* Rafinesque) - 1. Effects of weight, temperature, group size, oxygen level and opercular movement rate as a function of temperature. *Comp. Biochem. Physiol.* **62A**:351-356.  
{Keys: Fathead minnow/ O<sub>2</sub>/ Temperature/ Ventilation/ VO<sub>2</sub>}
822. Watson, W.H. III and G.A. Wyse. 1978. Coordination of the heart and gill rhythms in *Limulus*. *J. Comp. Physiol.* **124**:267-275.  
{Keys: Electromyogram (EMG)/ Ventilation}
823. Weatherly, A.H., S.C. Rogers and D.G. Pincock. 1980. Use of telemetry in monitoring intensity and energetics of activity in free-swimming fish with reference to zinc pollution. *Can Tech. Rep. Fish Aquat. Sci.* **975**:162-170.  
{Keys: Electromyogram (EMG)/ Ventilation}
824. Weatherly, A.H., P.S. Lake and S.C. Rogers. 1980. Zinc pollution and the ecology of the freshwater environment. In: *Zinc in the Environment* (J.O. Nriagu, ed.), pp. 337-418. John Wiley and Sons, New York.  
{Keys: Metal/ Ventilation}

825. Weintraub, M.J. and R.S. Mackay. 1975. Respiratory and heart beat synchrony studied by telemetry in the trout (*Salmo gairdneri*). *Copeia*. **1**:78-85.  
{Keys: Telemetry/ Ventilation}
826. Westlake, G.F., J. Cairns Jr. and K.L. Dickson. 1974. Response of biosensors to toxic spills. I. TNT effluent. *Contract with Edgewood Arsenal, Solicitation No. DAAA15-73-R-0300*. U.S. Army.  
{Keys: TNT/ Ventilation}
827. Westlake, G.F., J. Cairns Jr., K.L. Dickson and W.H. van der Schalie. 1974. Responses of biosensors to toxic spills. II. Nitroglycerine effluent. *Contract with Edgewood Arsenal, Solicitation No. DAAA15-73-R-0300*. U.S. Army.  
{Keys: Nitroglycerine/ Ventilation}
828. Westlake, G.F., W.H. van der Schalie, J. Cairns Jr. and K.L. Dickson. 1974. Responses of biosensors to toxic spills. III. pH. *Contract with Edgewood Arsenal, Solicitation No. DAAA15-73-R-0300*. U.S. Army.  
{Keys: Ventilation}
829. Westlake, G.F., W.H. van der Schalie, J. Cairns Jr. and K.L. Dickson. 1974. Responses of biosensors to toxic spills. IV. Nitrocellulose. *Contract with Edgewood Arsenal, Solicitation No. DAAA15-73-R-0300*. U.S. Army.  
{Keys: Ventilation}
830. Westlake, G.F., W.H. van der Schalie, J. Cairns Jr. and K.L. Dickson. 1976. The use of fish to continuously monitor an industrial effluent. Annals No. 2/ 075CH1004-118-4. pp. 1-3. The Institute of Electrical and Electronics Engineers, Inc.  
{Keys: Bluegill/ External electrodes/ *Lepomis sp.*/ Ventilation}
831. Westlake, G.F. and W.H. van der Schalie. 1977. Evaluation of an automated biological monitoring system at an industrial site. In: *Biological Monitoring of Water and Effluent Quality. ASTM STP 607* (J. Cairns Jr., K.L. Dickson and G.F. Westlake, eds.), pp. 30-37. American Society for Testing and Materials, Philadelphia (PA).  
{Keys: Bluegill/ Effluent/ Ventilation}
832. Westlake, G.F., J.B. Sprague and I.T. Brown. 1983. Sublethal effects of treated liquid effluent from a petroleum refinery. IV. Respiratory movements and coughing of rainbow trout. *Aquat. Toxicol.* **4**:317-25.  
{Keys: Cough/ Ventilation}
833. White, F.N. 1978. Comparative aspects of vertebrate cardio-respiratory physiology. *Annu. Rev. Physiol.* **40**:471-499.  
{Keys: Heart/ Ventilation}

834. Wilkes, P.R.H., R.L. Walker, D.G. McDonald and C.M. Wood. 1981. Respiratory, ventilatory, acid-base and ionoregulatory physiology of the white sucker (*Catostomus commersoni*): The influence of hyperoxia. *J. Exp. Biol.* **91**:239-254.  
{Keys: Blood pressure/ Heart/ Trout/ Ventilation volume (VG)/ VO<sub>2</sub>}
835. Williamson, R.M. and B.L. Roberts. 1981. Body cooling as a supplement to anaesthesia. *J. Mar. Biol. Assoc. U.K.* **61**:129-131.  
{Keys: Anesthetic/ MS<sub>222</sub>/ Ventilation}
836. Wingard, C.J. and C.J. Swanson. 1992. Ventilatory responses of four marine teleosts to acute rotenone exposure. *J. Appl. Ichthyol. Z. Angew. Ichthyol.* **8**(1-4):132-142.  
{Keys: Uncoupler}
837. Witters, H.E., S. Van Puymbroeck, A.J.H.X. Stouthart and S.E.W. Bonga. 1996. Physicochemical changes of aluminum in mixing zones: Mortality and physiological disturbances in brown trout (*Salmo trutta* L.). *Environ. Toxicol. Chem.* **15**(6):986-996.  
{Keys: Aluminum (Al)/ Blood/ Metal/ Ventilation frequency (fv)}
838. Wolf, N.G. and D.L. Kramer. 1987. Use of cover and the need to breathe: The effects of hypoxia on vulnerability of dwarf gouramis to predatory snakeheads. *Oecologia*. **73**(1):127-132.  
{Keys: Air breathing/ O<sub>2</sub>/ Predator/ Ventilation frequency (fv)}
839. Woltering, D.M., J.L. Hedtke and L.J. Weber. 1978. Predator-prey interactions of fishes under the influence of ammonia. *Trans. Am. Fish. Soc.* **107**(3):500-504.  
{Keys: Cough frequency (fc)/ Ventilation frequency (fv)/ Visual}
840. Wood, C.M. 1974. Mayer waves in the circulation of a teleost fish. *J. Exp. Biol.* **189**(2):267-274.
841. Wood, C.M., B.R. McMahon and D.G. McDonald. 1979. Respiratory gas exchange in the resting starry flounder (*Platichthys stellatus*): A comparison with other teleosts. *J. Exp. Biol.* **78**:167-179.  
{Keys: Blood/ Heart/ PO<sub>2</sub>/ Salmo sp./ Trout/ Ventilation}
842. Wood, C.M., B.R. McMahon and D.G. McDonald. 1979. Respiratory, ventilatory, and cardiovascular responses to experimental anaemia in the starry flounder (*Platichthys stellatus*). *J. Exp. Biol.* **82**:139-162.  
{Keys: Blood/ Heart/ Uptake efficiency (UE)/ Ventilation}

843. Wordingham, V. 1978. *Summary of WRC equipment developed for biological monitoring of water quality. Occasional Paper OR12*. Water Research Center, Medmenham Laboratory, Medmenham, P.O. Box 16, Marlow Bucks, SL7 2HD (UK).  
{Keys: Ventilation}
844. Wu, R.S.S. and N.Y.S. Wook. 1984. Respiratory responses and tolerance to hypoxia in two marine teleosts (*Epinephelus akaara* Temminck & Schlegel) and (*Mylio macrocephalus* Basilewsky). *Hydrobiologia*. **119**(3):209-217.  
{Keys: Bream/ Grouper/ O<sub>2</sub>/ Ventilation frequency (fv)}
845. Yakimovich, M.J. and H.L. Bergman. 1977. A noise-free method for separately recording opercular rate and heart rate from free-swimming fish. In: *Proceedings of the First International Conference on Wildlife Biotelemetry* pp. 50-57. University of Wyoming, Laramie (WY).  
{Keys: *Catostomus* sp./ External electrodes/ Heart frequency (fh)/ *Salmo* sp./ *Salvelinus* sp./ Sucker/ Trout/ Ventilation frequency (fv)}
846. Yamamoto, K., Y. Itazawa and H. Kobayashi. 1981. Gas exchange in the gills of yellowtail (*Seriola quinqueradiata*) under resting and normoxic conditions. *Bull. Jpn. Soc. Sci. Fish.* **47**(4):441-451.  
{Keys: Blood/ Ventilation volume (VG)}
847. Yamamoto, K. 1991. Effects of formalin on gas exchange in the gills of carp (*Cyprinus carpio*). *Comp. Biochem. Physiol.* **98C**(2-3):463-465.  
{Keys: Blood/ Hypoxia/ Irritant/ Ventilation volume (VG)}
848. Yazdani, G.M. and R.M. Alexander. 1967. Respiratory currents of flatfish. *Nature*. **213**:96-97.  
{Keys: Ventilation}
849. Yazdani, G.M. 1976. Respiratory adaptation in the flatfish (*Pleuronectiformes*). *Matsya*. **2**:23-27.  
{Keys: Morphology/ Ventilation}
850. Young, S. 1971. Electromyogram (EMG) activity in tench (*Tinca tinca*, L) gill lamellae and its association with coughing. *J. Physiol., Lond.* **215**:37-38.  
{Keys: Cough/ Ventilation}
851. Young, S. 1972. Electromyographic activity during respiration and coughing in the tench (*Tinca tinca*). *J. Physiol., Lond.* **227**:18-19.  
{Keys: Cough/ Electromyogram (EMG)/ Nervous system/ Ventilation}

852. Young, S. 1974. *Coughing in fish, a study of the expulsion reflexes*. Ph.D. Thesis. Faculty of Science of the University of London. 138 pp.  
{Keys: Anesthetic/ Cough/ Electromyogram (EMG)/ Nerve/ Ventilation}
853. Zeeman, M.G. and W.A. Brindley. 1976. DDT toxicity, symptomology and effects upon hematolgy of goldfish (*Carassius auratus*). *Utah Acad. Proc.* **53**(2):54.  
{Keys: Pesticides/ Ventilation frequency (fv)}
854. Zhou, B., Y. Zhang and Y. Xu. 1994. Toxic effects of meothrin on the gill ultrastructure in grass carp (*Ctenopharyngodon idellus*). *J. Environ. Sci. China.* **6**(1):52-61.  
{Keys: Blood/ Cough/ Gill damage/ Gill/ LC<sub>50</sub>/ Morphology}
855. Zimmerman, K.D., G.R. Gates and H. Heatwole. 1990. Effects of venom of the olive sea snake (*Aipysurus laevis*) on the behaviour and ventilation of three species of prey fish. *Toxicon.* **28**(12):1469-1478.  
{Keys: Behavior/ Locomotion/ Predator/ Venom/ Ventilation}
856. Zimmerman, K.D. and H. Heatwole. 1992. Ventilation rates in three prey fish species treated with venom of the olive sea snake (*Aipysurus laevis*). *Comp. Biochem. Physiol.* **102C**(3):421-425.  
{Keys: Chromis/ *Dascyllus* sp./ *Istiblennius* sp./ Predator/ Ventilation}
857. Zimmerman, K.D. and D.J. Watters. 1994. Ventilation rates in a prey species of fish (*Dascyllus aruanus*) treated with the venom of the olive sea snake (*Aipysurus laevis*). *Comp. Biochem. Physiol.* **107C**(3):463-467.  
{Keys: Neurotoxicity/ Predator/ Ventilation frequency (fv)}

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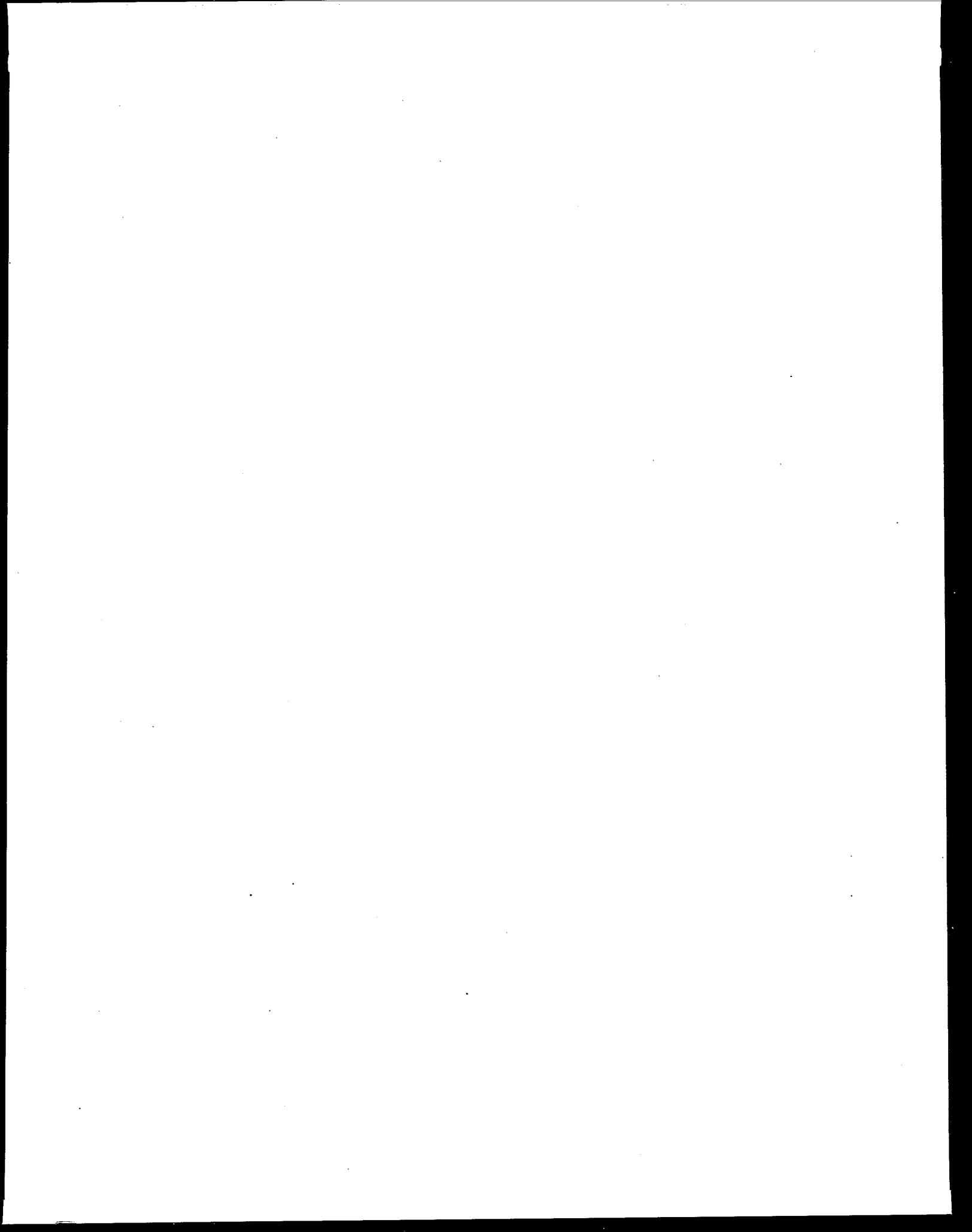
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