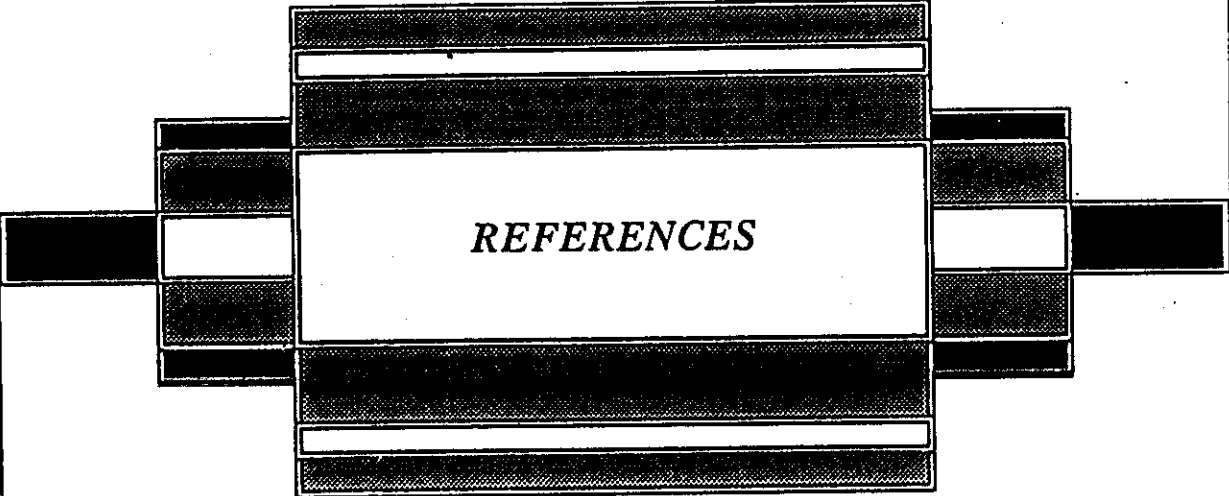




REFERENCES

REFERENCES

- Abdel-Aziz, H. (1982): Seasonal variation in the lethality of zinc to benthic and pelagic freshwater teleosts; Clarias lazera and Tilapia zilli. M.Sc. Thesis., Faculty of Science, Alexandria University.
- Abdel-Baky, T.E. & Elserafy, S.S. (1990): Studies on the food and feeding habits of four species of cichlid fishes in the western region of Manzalah Lake., Egypt. Mans. Sci. Bull., 17 (1): 411-428.
- Abdel-Moneim, N.; Saad, S.; El-Deeb, S.; Kandeel, K. and El-Sayed, A. (1990): Biochemical genetics in testing for the Egyptian Plastic and Electric Company Wastes Inhibition using Tilapia nilotica: III Effect of wastes on Amino Acids. Proc. Intern. Symp. Bio. Cul. Tilapias, 91-118. Alex. Egypt.
- Abu-Hegab, S.; Kandil, A. and Moharram, N. (1990): Studies on the effects of exposure of grass carp; Ctenopharyngodon idella to several environmental pollutants. Changes in plasma sodium and potassium concentration and muscle and liver water content., Proc. Zool. Soc. Egypt, 39: 143-156.
- Adham, K.G. (1992): Response of the Egyptian toad; Bufo regularis to acute copper contamination. J. Egypt. Ger. Soc. Zool., 8 (A):141-158.
- Agrawal, U. and Srivastava, A.K. (1976): Effect of cold shock on the abundance of blood cells in the circulation of a fresh water teleost; Colisa fasciatus. Arch. Anat. Micro. Morphol. Exper., 65: 165-174.

-
- Ahmed, N.A.; El-Serafy, S.S.; El-Shafey, A.A.M. and Abd-El-Hamid, N.A.H. (1992): Effect of ammonia on some haematological parameters of Oreochromis niloticus. Proc. Zool. Soc. A.R.Egypt, 23 (1): 155-160.
- Albahary, C. (1972): Lead and hemopoiesis. The mechanism and consequences of the erythropathy of occupational lead poisoning., Am. J. Med., 52: 367-378.
- Alekseeva, J.I. (1965): Belkovyj sostav syvorotki krovi prifascioleze i ego izmenenija prilecenili hloksilom., Mat. Mauc. Konf. V.O.G. Cast., 111: 7-9.
- Alexander, J.B. (1977): Protein concentration in the serum of the Atlantic Salmon (Salmo salar) in North-West England and Northern Ireland., J. Fish Biol., 11: 673-679.
- Al-Hussaini, A.H. and Al-Kholy, A.A. (1953); On the functional morphology of the alimentary tract of some omnivorous teleost fish. Proc. Egypt Acad. Sci., 4: 17-39.
- Amend, D.F.; Yosutake, W.T. and Morgan, R. (1969): Some factors influencing susceptibility of rainbow trout to the acute toxicity of an ethyl mercury phosphate formation (TIMSAN). Trans. Am. Fish. Soc., 98: 419-425.
- Anderson, A.C. and Abd El-Ghani, A.A. (1980): Toxicity of selected arsenical compounds in short term bacterial bioassays. Bull. Envir. Contam. Toxic., 24: 124-127.
- Anon (1973): Water quality criteria 1972. (National Academy of sciences / National Academy of Engineering, Washington D.C.)
-

-
- Arizono, K.; Okanari, E.; Ueng, K. and Ariyoshi, T. (1991): Hemeoxygenase activity and cytochrome P-450 content associated with induced metallothionein in the liver of rats treated with various metals., J. Environ. Sci. Health AA 26 (6): 941-951.
- Armitage, P. (1974): Statistical methods in medical research. Black Well Scientific Publications, Oxford 3rd Printing.
- AuBin, ST. D.J. and Geraci, J.R. (1989): Adaptive changes in hematologic and plasma chemical constituents in captive beluga whales delphinapterus- leucas., Cand. Fish Aquat Sci., 46 (5): 796-803.
- Baars, A.J.; Van Beek, H.; Spierenburg, T.J.; Beeftink, W.G.; Nieuwenhuize, J.; Pekelder, J.J. and Boom, J. (1988): Environmental contamination by heavy metals and fluoride in Saeftinge saltmarsh (the Netherlands) and its effect on sheep., J. Announce., 10 (2): 90-98.
- Baker, J.T.P. (1969): Histological and electron microscopical observations on copper poisoning in the winter flounder (Pseudopleuronectes americanus). J. Fish Res. Bd. Can., 26: 2785-2793.
- Banis, R.J.; Pond, W.J.; Walker, Jr.E.F. and O'Conner, J.R. (1969): Dietary cadmium iron and zinc interaction in the growing rat. Proc. Soc. Exp. Biol. Med., 130: 802-806.
- Barnhart, R.A. (1969): Effects of certain variables on hematological characteristics of rainbow trout. Trans. Am. Fish. Soc., 98: 411-418.

-
- Beattie, J.H. and Pascoe, D. (1978): Cadmium up take by rainbow trout; Salmo gairdneri eggs and alevins. J. Fish Biol., 13: 631-637.
- Benoit, D.A. and Holcombe, G.W. (1978): Toxic effects of zinc on fathead minnows; Pimephales promelas in soft water. J. Fish Biol. 13: 701-708.
- Benov, L.C.; Benchev, I.C. and Monovich, O.H. (1990): Thiol antidotes effect on lipid peroxidation in mercury poisoned rats. Chem. Biol. Interact., 76(3): 321-332.
- Berk, P.D.; Tschudy, D.P.; Shepley, L.A.; Waggoner, J.G. and Berlin, N.I. (1990): Hematological and biochemical studies in a case of lead poisoning. Am. J. Med., 48: 137-144.
- Bilinski, E. and Jonas, R.E.E. (1973): Effects of cadmium and copper on the oxidation of lactate by rainbow trout; Salmo gairdneri, gills. J. Fish Res. Bd. Can., 30: 1553-1558.
- Blalock, T.L. and Hill, G.H. (1988): Studies on the role of iron in zinc toxicity in chicks. Biol. Trace. Elem. Res., 17: 17-29.
- Blaxhall, P.C. (1972): The haematological assessment of the health of fresh water fish. J. Fish Biol., 4: 593-604.
- Bloomer, L. and Sourkes, T.L. (1973): The effect of copper loading on the distribution of copper in the rat liver cytosol. Biochem. Med., 8: 78-91.
- Boge, G.; Ndiaye, P.; Roche, H. and Peres, G. (1988): Effects of non-lethal concentrations of hexavalent chromium on intestinal enzymology of Salmo gairdneri and Dicentrarchus labrax. J. Physiol. (Paris), 93 (2): 57-63.
-

-
- Bonham, K.; Zafarullah, M. and Gedamu, L. (1987): The rainbow trout metallothioneins: molecular cloning and characterization of two distinct DNA sequences. *Announcement*, 6 (6): 519-528.
- Booke, H.E. (1964): A review of variations found in fish serum proteins. *N.Y. Fish Game J.*, 11: 47-57.
- Bremner, I. (1987): Nutritional and physiological significance of metallothionein. *Experientia (Suppl.)*, 52: 81-107.
- Brezonik, P.L. (1974): Analysis and speciation of trace metals in water supplies. In *Aqueous Environmental chemistry of Metals*. (Edited by Rubin A.J.) PP. 197-191. Ann Arbor Science, Ann Arbor, M.I.
- Briggs, R. (1979): The continuous monitoring of raw water intakes. *J. Inst. Wat. Engrs Sci.*, 33: 84-89.
- Brooks, R.R.; Presley, B.J. and Kaplan, I.R. (1967): APDC-MIBK extraction system for the determination of trace elements in saline waters by atomic-absorption spectrophotometry. *Talanta*, 14: 809-816.
- Brown, V.M.; Jordan, D.H.M. and Tiller, B.A. (1969): the acute toxicity to rainbow trout of fluctuating concentrations and mixtures of ammonia, phenol and zinc. *J. Fish Biol.*, 1: 1-9.
- Brungs, W.A. (1969): Chronic toxicity of zinc to the fathead minnow; Pimephales promelas. *Trans. Am. Fish. Soc.*, 98: 272-279.
- Bryan, G.W. (1971): The effects of heavy metals other than mercury on marine and estuarine organisms. *Proc. Roy. Soc. Lond. B.*, 177: 389-410.
-

-
- Bryan, G.W. (1976): Some aspects of heavy metal tolerance in aquatic organisms. In: Effects of pollutants on aquatic organisms. Edited by Lockwood. A.P.M. Soc. Exp. Bio. Seminar Series Cambridge Univ. Press. PP. 7-34.
- Cairns, J.Jr.; Dickson, K.L. and Westlake, G.F. (Eds). (1977): Biological Monitoring of water and Effluent Quality. Symposium: Biological Monitoring of Water Ecosystems. Blackburg, Virginia, Technical publication 04-607000-16, American, Society for Testing Materials Philadelphia.
- Cairns, J.Jr. and Gruber, D. (1979): coupling mini and micro-computers to biological early warning systems. Bio-Science., 29, 665.
- Camber, H.; Gall Ayher, P. and Foulkner, A. (1968): Distribution of mercury among blood fractions and serum proteins. Am. Ind. Hyg. Assoc. J., 29: 233-237.
- Carpene, E.; Cattani, D.; Serrazanetti, G.P.; Fedrizzi, G. and Cortesi, P. (1990): Zinc and copper in fish from natural waters and rearing ponds in northern Italy. J. Fish Biol., 37: 293-299.
- Chernoff, B. and Dooley, J.K. (1979): Heavy metals in relation to the biology of the mummichog; Fundulus heteroclitus. J. Fish Biol., 14:309-328.
- Chervinski, J. (1961): Laboratory experiments on the growth of Tilapia nilotica in various saline concentrations. Bamidgeh, 13: 8-14.
- Chliamovitch, Y.P. and Kuhn, C. (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: 575-585.
-

-
- Christensen, G.M. (1975): Biochemical effects of methylmercuric chloride, cadmium chloride and lead nitrate on embryos and alevins of the brook trout, Salvelinus fontinalis. Toxicol. Appl. Pharmacol., 32: 191-197.
- Christensen, G.M.; Mckim, J.M.; Brunges, W.A.; and Hunt, E.P. (1972): Changes in the blood of the brown bullhead (Ictalurus nebulosus Lesueur) following short-term exposure to copper. Toxicol Appl. Pharmacol., 23: 417-427.
- Christensen, G.M.; James, T.; Fiandt-Barbara, A. and Poeschl (1978): Cells, proteins, and certain physical-chemical properties of brook trout (Salvelinus fontinalis) blood. J. Fish Biol., 12: 51-60.
- Clark, S.; Whitmore, D.H.Jr. and McMahon, R.F. (1979): Considerations of blood parameters of large mouth bass; Micropterus salmoides. J. Fish Biol., 14: 147-158.
- Corner, E.D.S. and Sparrow, B.W. (1956): The modes of action of toxic agents. I. Observations in the poisoning of certain crustaceans by copper and mercury. J. Mar. Biol. Ass., 35: 531-548.
- Cowey, C.B.; Knox, D.; Adron, J.W.; George, S. and Pirie, B. (1977): The production of renal calcinosis by magnesium deficiency in rainbow trout (Salmo gairdneri) Br. J. Nutr., 38: 127-135.
- Cox, D.H. and Harrisa, D.L. (1960): Effect of excess dietary zinc on iron and copper in rat., J. Nutr., 70: 512-520.
- Crandall C.A. and Goodnight C.J. (1963): The effects of sublethal concentrations of several toxicants to the common guppy; Lebistes reticulatus. Trans. Am. Microsc. Soc., 82: 59-73.

-
- Cyriac, P.J.; Antory, A. and Nambisan, P.N. (1989): Hemoglobin and hematocrit values in the fish, Oreochromis mossabicus (Peters) after short-term exposure to copper and mercury. Bull. Environ. contam. Toxicol., 43 (2): 315-20.
- Davies, D.H. (1975): The isolation and characterisation of the light "antibody" from Atlantic salmon (Salmo salar). Doctoral thesis. University of Salford.
- Davies, P.H. and Everhart, W.H. (1973): Lead toxicity to rainbow trout and testing application factor. In: Effects of chemical variation in aquatic environment. Vol. 3. 80 PP. Washington D.C. Ecol. Res. Ser. Environ. Prot. Agency.
- Dawson, A.B. (1935): The hemopoietic response in the catfish; Ameiurus nebulosus to chronic lead poisoning. Biol. Bull., 68: 335-346.
- De-Bruin, A. (1971): Certain biological effects of lead upon the animal organs. Achs. Envir. Hlth., 23: 249-264.
- Denton, J.E. and Yousef, M.K. (1975): Seasonal changes in haematology of rainbow trout (Salmo gairdneri). Comp. Biochem. Physiol., 51A: 151-153.
- Dewor, W.A.; Wight, P.A.L.; Pearson, R.A. and Grtte, M.J. (1983): Toxic effects of high concentrations of zinc oxide in the diet of the chick and laying hen. Boil. Poull. Sci., 24: 397-404.
- Donaldson, W.E. (1982): Trace element toxicity in: Introduction to biochemical toxicology. Hodgson, E. and Guthrie F.E. (1982). Elsevier New York. Amsterdam. Oxford.

- Dove, G.R.; Tiemier, O.W. and Deyoe, C.W. (1976): Effects of three diets on growth and mineral retention of channel catfish fingerlings. Trans. Am. Fish. Soc., 105: 481-485.
- Dwyer, F.J.; Schmitt, C.J.; Finger, S.E. and Mehrle, P.M. (1988): Biochemical changes in longear sunfish; Lepomis megalotis, associated with lead, cadmium and zinc from mine tailing. J. Fish Biol., 33: 307-317.
- Eaton, J.G. (1974): Chronic cadmium toxicity of the bluegill (Lepomis macrochirus Rafinesque). Trans. Am. Fish. Soc., 103: 729-735.
- Effler, S.W.; Litten, S.; Field, S.D.; Tong-Ngork, T.; Hale, F.; Meyer, M. and Quirk, M. (1980): Whole lake response to low level copper sulphate treatment. Water Res., 14: 1489-1499.
- Eisler, R. (1971): Cadmium poisoning in Fundulus heteroclitus (pisces Cyprinodontidae) and other marine organisms. J. Fish Res. Bd. Can., 28: 1225-1234.
- Eisler, R. (1979): Copper accumulation in coastal and marine biota. In copper in the environment. Part I: Ecological cycling, PP. 383-449. Ed. by J.O. Nriogu New York. Wiley & Sons.
- Eisler, R. and Gardner G.R. (1973): Acute toxicology to an estuarine teleost from mixtures of cadmium, copper and zinc salts. J. Fish Biol., 5: 131-142.
- Eisler, R.; Zarogian, G.E. and Hennecky, R.J. (1972): Cadmium uptake by marine organisms. J. Fish Res. Bd. Can., 29: 1367-1369.
- El-Begearmi, M.M.; Ganther, H.E. and Sunde, M.L. (1982): Dietary interaction between methylmercury, selenium, arsenic and sulfur amino acids in Japanese quail. Poult. Sci., 61: 272-279.

-
- El-Deeb, S.; Abd-El-Moneim, N.; Saad S., Kundeel K. and A. El-Sayed. (1990): Biochemical genetics in testing for the Egyptian Plastic and Electric Company Wastes. Inhibition using Tilapia nilotica. II Effect of wastes on protein polymorphism. Proc. Intern. Symp. Biol. Cult. Tilapias., 27-31. October 1990 Alx. Egypt.
- Ellgaard, E.G.; Joseph, E.T. and Anthony, A.M.Jr. (1978): Locomotor activity of the bluegill Lepomis macrochirus: hyperactivity induced by sublethal concentrations of cadmium, chromium and zinc. J. Fish Biol., 1: 19-23.
- El-Missiry, M.A.; Othman, A.I.; Fayed, Th. A. and Zeghiber, F. (1991): Effect of mercuric chloride on body weight total lipid and thiol contents of liver and brain of male albino rats. J. Egypt. Ger. Soc. Zool., 5: 129-135.
- El-Zarka, S. (1956): Breeding behaviour of the Egyptian cichlid fish (Tilapia zilli). Copeia, 2: 112-113.
- El-Zarka, S.; Shaheen, A.H. and Aleem, A.A. (1970b): Reproduction of Tilapia nilotica (L.) Bull. Inst. Ocean. Fish Egypt, 1: 193-204.
- Everall, N.C.; Macfarlane, N.A.A. and Sedgwick, R.W. (1989): The interactions of water hardness and pH with the acute toxicity of zinc to the brown trout; Salmo trutta L.J. Fish Biol 35: 27-36.
- Fayed, T.A.; El-Missiry, M.A.; Othman, A.I. and Zeghiber, F. (1991): Effect of mercury on aminotransferases and serum proteins of male albino rats. J. Egypt. Ger. Soc. Zool., A (5): 95-106.
-

- Fisher, C.; Laursen0Jones, A.P.; Hill, K.J. and Hardy, W.S. (1973): The effect of copper sulphate on performance and the structure of the gizzard in broilers. *Brit. Poult. Sci.*, 14: 55-68.
- Foster, P. and Morris, A.W. (1971): The seasonal variation of dissolved ionic and organically associated copper in the Menai straits. *Deep Sea Research*, 18: 231-236.
- Franzmann, A.W. and Leresche, R.E. (1978): Alaskan moose blood studies with emphasis on condition evalutaion. *J. Wild life Manag.*, 42 (2): 334-351.
- Froseth, J.As.; Piper, R.C. and Carlson, J.R. (1974): Relationship of dietary selenium and oral methylmercury to blood and tissue selenium and mercury concentrations and deficiency-toxicity signs in swine. *Fed. Proc.*, 33: 660 (Abstract).
- Gardner, G.R. and Yevich, P.P. (1970): Histological and hematological response of an estuarine teleost to cadmium. *J. Fish Res. Bd. Can.*, 27: 2185-2196.
- Gaudet, M.; Racicot, J.G. and Leray, C. (1975): Enzyme activities of plasma and selected tissues in vainbow trout; Salmo gairdneri Richardson. *J. Fish Biol.*, 7:505-512.
- Ghazaly, K.S. (1985): Studies of the effects of both zinc and copper concentrations on some organs of the crab; Portunus pelagicus (L). Ph. D. Thesis University of Alexandria A.R.E.
- Gordon, M.S. (1982): *Animal physiology: Principles and adaptations*. 4th edn. PP. 635. New York: Macmillan.
- Goriacev, W.E. (1968): Dinamika uglevod-belkovykh kompleksov pri teeapii ostrogo fasciolieza ovec. *Mat. Nauc. Konf. V.O.G. Cast*, 1: 62-68.
-

-
- Gray, J.S. (1974): Synergistic effects of three heavy metals on growth rates of a marine ciliate protozoan. In: Pollution and physiology of marine organisms, PP. 465-483. Ed. by F.J.Vernberg and W.B. Vernberg. New York and London: Academic Press.
- Grobler-Van-Heerden, E.; Van-Vuren, J.H. and du-Preez, H.H. (1991): Bioconcentration of atrazine, Zinc and iron in the blood of Tilapia sparrmanii (cichlidae). Comp. Biochem. Physiol., C. 100 (3): 629-33.
- Guinee, V.P. (1972): Lead poisoning. Am. J. Med. 52: 283-288.
- Gupta, A.K. and Rajbauski, V.K. (1981): Measurement of acute toxicity of copper to the freshwater teleost; Mystus bleekeri, using bioassay, statistical and histopathological methods. Arch. Hydrobiol. 91: 427-434.
- Haggag, G.; El-Hussini, M.; Khalil, M.S. and AbdEl Aaty, F. (1978): Serum proteins, total nitrogen of the blood of Clarias lazera as affected by season. Proc. Zool. Soc. A.R.E., 5: 161-167.
- Hamilton, D.L. and Volbrg, L.S. (1974): Relationship between cadmium and iron absorption. Am. J. Physiol., 227:1033.
- Hammond, P.B. (1969): Lead poisoning. An old problem with a new dimension. In Essay on Toxicology. Vol. 1 (F.R. Blood, ed), PP., 116-155. New York. Academic Press.
- Hardy, H.L.; Chamberlain, R.I.; Maloof, C.C.; Boylen, G.W.Jr. and Howell, M.C. (1973): Lead as an environmental poison. Clin. Pharmac. Ther., 12: 982-1002.
-

- Harper, H.A.; Rodwell, V.W. and Mayes, P.A. (1977): Review of physiological chemistry, 16th ed., Lange Med. Publ. Los. Altos., C.A.
- Hattingh, W.H.J. (1979): The chemical composition of water and the analytical chemist. A challenge. Presented at the 26th conference of the south African Chemical Institute, Port Elizabeth.
- Heath, A.G. (1984): Changes in tissue adenylate and water content of bluegill; Lepomis macrochirus exposed to copper. J. Fish Biol., 24: 299-309.
- Hegazy, H.G. (1991): Counteracting effects of some metals against mercury toxicity of the Japanese Quail; Coturnix Japonica M.Sc. Thesis Facult. of Sci. Ain Shams. University A.R.E.
- Helal, A.F.; Mekkawy, M.Y.; Shamma, T.A. and El-Sharabassy, A.A.M. (1987): Effect of inhaled manganese on thyroid and adrenal functions in Japanese Quail. 12th International congress for statistics, Computer Science, Social and Demographic Research. Cairo, Egypt.
- Hill, C.H. (1974): Reversal of selenium toxicity in chicks by mercury, copper and cadmium. J. Nutr., 104: 593-598.
- Hilmy, A.M.; Abd-ElHamid, N.F. and Ghazaly, K.S. (1988): Variation of zinc and copper levels with sex and size in different tissues of the crab; Lortanus pelagicus (Linnoeus). Folia Morph., 36: 160-166.
- Hilmy, A.M.; Shabana, B.M. and Said, M.M. (1980): Haematological responses to mercury toxicity in the marine teleost; Aphanius dispar (Rupp.). Comp. Biochem. Physiol., 67 (C): 147-158.

- Hodgson, E. and Guthrie, F.E. (1982): Introduction to biochemical toxicology. Elsevier science publishing Co. New York Amsterdam Oxford.
- Hodson, P.H. (1974): The effect of temperature on the toxicity of zinc to fish of the genus salmo. Doctoral dissertation. University of Guelph, Guelph, Canada.
- Hondo, K.; Min B.V. and Talsukawo R. (1986): Distribution of heavy metals and their age-related changes in the Eastern Great, White Gret, Egretta-alba Mosesta in koieo. Ach. Environ. Contam. Toxicol., 15(2): 185-198.
- Hsu, F.S.; Krook, L.; Pond, W.G. and Duncan, J.R. (1975): Interactions of dietary calcium with toxic levels of lead and zinc in pigs. J. Nutr., 105: 112-118.
- Hughes, G.M. (1973): Respiratory responses to hypoxia in fish. Am. Zool., 13: 475-489.
- Hughes, G.M. (1976): Fish respiratory physiology. In: Perspectives in experimental biology. (P.Spencer Davies, ed.) Vol.1, PP. 235-245. Oxford, New York.
- Hughes, G.M. (1981): Effects of low oxygen and pollution on the respiratory system of fishes. In: Stress and fish. (A.D.Pickering, ed.), PP. 121-146. New York: Academic Press.
- Hughes, G.M. and Flos, R. (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.

-
- Ibrahim, M.S.; Abd-Allah, G.; Abdel-Baky, T.E. and Bahnasawy, M.H. (1991): Toxic effects of environmental pollution by herbicide gallant and mercury on liver function of the Nile cat fish; Clarias lazera. J. Egypt. Ger. Soc. Zool., 6(A): 189-199.
- Idoniboye-Obu, B. (1977): Bioelectric action potentials of procambarus acutus acutus (Girard) in serially diluted solutions of selected C₆ hydro carbons in water. Envir. Pollut., 14: 5-24.
- Im, M.J.C.; Hsu, J.M. and Hoopes, J.E. (1975): Enzyme activities in the epidermis of zinc deficient rats. Fed. Proc., 34: 906 (Abstract).
- Jackim, E.; Hamlin, J.M. and Sonis, S. (1970): Effects of metal poisoning on five liver enzymes in the killifish (Fundulus heteroclitus). J. Fish Res. Bd. Can., 27: 383-390.
- James, R.; Sampath, K. and Ponmani, K.P. (1992): Effect of metal mixtures on activity of two respiratory enzymes and their recovery in Oreochromis mossambicus (Peters). Indian, J. Exp. Biol., 30(6): 496-9.
- Jarvenpaa, T.; Tillander, M. and Miettinen, T.K. (1970): Methylmercury: half-time of elimination in flounder, pike and eel. Soum. Kem. B., 43: 439-442.
- Jeffer, E.H. (1991): Biochemical basis of toxicity In: Hand Book of toxicologic pathology. Haschek W.M. and Rouseux C.G. Academic Press. Inc. U.K.
- Kaji, T.; Takata, M.; Hoskino T., Miyahara, T.; Kozula, H.; Kurashige, Y. and Koizumi, F. (1988): Role of zinc in protection against cadmium induced toxicity in formation of embryonic chick bone in tissue culture. Toxicol. Let., 44 (1-2): 219-227.
-

- Khadre, S.E.M. (1990):** Changes in the gill structure and blood profiles following acute copper toxicity in two freshwater teleosts. Proc. Intern. Symp. Biol. Cult. Tilapias. Alex. University.
- Kind, P.R.N. and King, J. (1954):** Estimation of plasma phosphatase by determination of hydrolysed phenol with aminoantipyrine. J. Clin. Path., 7: 322-326.
- King, D.W.; Chrn, D.C.C.; Wung, A.W.S.; Hsu, T.; Lai, T.M.; Chang, H. and Lu, G.R. (1980):** Interrelation ships of zinc, cadmium and lead in chick embryogenesis. Proc. Nat. Sci. Coun., 4 (11): 55-64.
- Kito, H.; Ose, Y.; Sato, T.; Ishikawa, T. and Tazawa, T. (1980):** Formation of metallothionein in fish. J. Pharmacobia-Dynam. 3: 5-23.
- Kool, H.J.; Vonkranen, H.J.; Bakker, G. and Jone, D.H. (1979):** (Quoted from slabbert J.L. and Morgan S.G. 1982. Water Res. 16: 517-523.) Slabbert, J.L. and Morgan, S.G.(1982): Abioassay technique using tetrahymena pyriformis for the rapid assessment of toxicants in water. Water Res., 16: 517-532.
- Larsson, A.; Bengtsson, B.E. and Svanberg, P. O. (1976):** Some hematological and biochemical effects of cadmium on fish. In Effects of pollutants on aquatic organisms. (A.P.M. Lockwood, ed.) Soc. Exp. Bio. Seminar Series. 2, PP. 35-46. Cambridge: Combridge University Press.
- Ledoux, D.R.; Miles, R.D.; Ammerman, C.B. and Harm, R.H. (1987):** Interaction of dietary nutrient concentration and supplemental copper on chick performance and tissue copper concentrations. Poult. Sci., 66(8): 1379-1384.

- Lee, D.Y.; Brewer, G.J. and Wong, Y.X. (1989): Treatment of wilson's disease with zinc. VII-protection of the liver from copper toxicity by zinc induced metallothionein in rat model. J. Lab. Clin. Med., 114(6): 639-645.
- Lewis, M. (1978): Acute toxicity of copper, zinc and manganese in single and mixed salt solutions to juvenile longfin dace; Agosia chrysogaster. J. Fish. Biol. 13: 695-700.
- Lewis, S.D. and Lewis, V.M. (1971): The effect of zinc and copper on the osmolality of blood serum of the channel catfish; Ictalurus punctatus , and globen shiner; Notemigonus crysoleucas Mitchell. Trans. Am. Fish Soc., 100: 639-643.
- Linden, O.; Sharp, J.R.; Laughlin, R.Jr. and Neff, J.M. (1979): Interactive effects of salinity, temperature and chronic exposure to oil on the survival and developmental rate of embryos of the Estuarine killifish; Fundulus heteroclitus., Mar. Bio., 51: 101-109.
- Lingskog, S. and Malmstrom, B.G. (1962): Metal binding and catalytic activity in bovine carbonic anhydrase. J. Biol. Chem., 237: 1129-1137.
- Lloyd, R. (1961): The toxicity of mixtures of zinc and copper sulphates to rainbow trout (Salmo gairdneri Richardson). Ann. Appl. Biol., 49: 535-538.
- Lockwood, A.P.M. (1976): Effect of pollutant on aquatic organisms. Soc. Exp. Biol. Seminar Series, Cambridge Univ. Press. PP. 35-45.
- Lorz, H.W. and Mcpherson, B.P. (1976): Effects of copper or zinc in freshwater on the adaptation to sea water and ATP ase activity, and the effects of copper on migratory disposition of coho

-
- salmon (*Oncorhynchus risutch*). J. Fis. Res. Bd. Can., 33: 2023-2030.
- Lyle, J.M. (1984):** Mercury concentrations in four carcharhinid and three hammerhead sharks from coastal of the Northern territory., Aust. J. Mar. Freshw. Res., 35: 441-51.
- Macey, D.J.; Cake, M.H. and Potter, I.C. (1988):** Exceptional iron concentrations in larval lampreys (*Geotria australis*) and activities of superoxide radical detoxifying enzymes. Biochem. J., 252(1): 167-72.
- Magee, A.C. and Matrone, Q. (1960):** Studies on growth, copper metabolism and iron metabolism of rats fed high levels of zinc. J. Nutr., 72: 232-242.
- Maita, M.; Shiomitsu, K. and Ikeda, Y. (1984):** Health assessment by the climogram of hemochemical constituents in cultured yellowtail. Bull. Jap. Soc. Scient. Fish., 51: 205-211.
- Marie, M.A. (1990):** Effect of sublethal concentration of zinc on blood parameters of the Nile catfish (*Clarias lazera*). Proc. Zool. Soc. A.R.Egypt., 18: 413-423.
- Marshall (1979):** (Quoted from Slabbert J.R. and Morgan S.G., 1982 Water Res. 16: 517-523.) Slabbert, J.L. and Morgan, S.G. (1982): Abioassay technique using tetrahymena pyriformis for the rapid assessment of toxicants in water. Water Res., 16:517-532.
- Martin, D.W.; Mayes, P.A. and Rodwell, V.W. (1981):** Harper's review of Biochemistry. 18th ed. Lange Medical Publ. Los Altos, California 94022.
-

- Mazhar, F.M.; Ashry, M.A. and Kadry, S.M. (1987): Effects of environmental pollution by mercury on blood parameters of the Nile catfish; Clarias lazera. Proc. Zool. Soc. A.R.Egypt., 13: 247-256.
- McCarthy, D.H.; Stevenson, J.P. and Roberts, M.S. (1973): Some blood parameters of the rainbow trout (Salmo gairdneri Richardson). I. Kamloops Variety. J.Fish Biol., 5: 1-8.
- McFarlane, G.A. and Franzin, W.G. (1978): Elevated heavy metals: a stress on a population of white suckers; Catostomus commersoni, in Hammel Lake, Saskatchewan. J. Fish Res. Bd. Can. 35: 963-970.
- McKee, J.E. and Wolf, H.W. (1963): Water Quality Criteria. 2nd edn. The Resources Agency of California, State Water Quality Control publ. No. 3-A.P. 294-297.
- McKim, J.M. (1985): Early life stage toxicity tests. In Fundamentals of Aquatic toxicology (G.M. Rand and S.R. Petrocelli, eds.) PP. 56-96. Washington, DC: Hemisphere Publishing.
- McKim, J.M.; Christensen, G.M. and Hunt, E.P. (1970): Changes in the blood of brook trout; Salvelinus fontinalis after short-term and long-term exposure to copper. J. Fish Res. Bd. Can., 27: 1883-1889.
- McLeay, D.J. (1975): Sensitivity of blood cell counts in juvenile coho salmon; (Oncorhynchus kisutch) to stressors including sublethal concentrations of pulp mill effluents and zinc. J. Fish Res. Bd. Can., 32: 2357-2364.
- Meisner, H.M. and Hickman, C.P. (1962): Effect of temperature and photoperiod on the serum proteins of the rainbow trout (Salmo gairdneri). Can. J. Zool., 40: 127-130.

- Mertz, W. (1977): Criteria for adequacy and safety of trace elements in animal nutrition. J. Anim. Sci., 44(3): 469-474.
- Mikhail, T.H.; Ahmed, N.; Gamal El-Din, S.M.; El-Borady, K.A.R. and Ibrahim, K.A. (1991): Role of zinc on growth rate of chicks and its effect on serum alkaline phosphatase, Proc. Zool. Soc. A.R.E., 21: 15-26.
- Mishra, S. and Srivastava, A.K. (1979): Hematology as index of sublethal toxicity of zinc in a fresh water teleost. Bull. Environ. Contam. Toxcol., 22: 695-698.
- Mishra, S. and Srivastava, A.K. (1980): The acute toxic effects of copper on blood of teleost. Ecotoxicol. Environ. Safety., 4: 191-194.
- Moore, J.W. and Sutherland, D.J. (1980): Mercury concentrations in fish inhabiting two polluted lakes in northern Canada. Water Res., 14: 903-907.
- Moudler, S.M. (1980): Combined effect of the chlorides of mercury and copper in sea water on Euryhaline amphipod; Gammarus duebeni. Mar. Biol., 59: 193-200.
- Mulcahy, M.F. (1969): Serum protein changes in U.D.N. infected Atlantic salmon: a possible method of diagnosis. J. Fish Biol. 1: 333-338.
- Mulcahy, M.F. (1971): Serum protein changes associated with ulcerative dermal necrosis (U.D.N.) in brown trout; Salmo trutta L. J. Fish Biol., 3: 199-201.

- Mulcahy, M.F. (1975):** Fish blood changes associated with disease: a hematological study of pike lymphoma and salmon ulcerative dermal necrosis. In the pathology of fishes (W.E. Ribelin & G. Migaki, eds.), PP. 925-944. Madison, Wisconsin University of Wisconsin Press.
- Murakami (1980):** (Quoted from Slabbert J.R. and Morgan, S.G., 1982. Water. Res., 16: 517-523.) Slabbert, J.L. and Morgan, S.G. (1982) Abioassay technique using tetrahymena pyriformis for the rapid assessment of toxicants in water. Water. Res., 16:517-532.
- Murphy, B.R.; Atchison, G.J.; Alan, W.M. and Kalar, D.J. (1978):** Cadmium and zinc content of fish from an indstrially contaminated lake. J. Fish Biol., 13: 327-335.
- Nelder, K.H. and Havebridg, K.M. (1974):** Zinc therapy of a crodermatitis enteropathie. N. Engl. Med. J., 292: 879-882.
- Norhelm, G. (1987):** Several protective mechanisms to diminish the effects of heavy metal contamination., Environ. Pollut. 47(2): 83-94.
- O'Dell, B.L. (1967):** Dietary interaction of copper and zinc. In Proceedings University of Missouri 1st annual conference on trace substances in Environmental Health. (D.D. Hemphill, ed.), PP. 134-139.
- Panigrahi, A.K. and Misra, B.N. (1978):** Toxicological effects of mercury on a fresh water fish; Anabas scandens and their ecological implications. Environ. Pollut., 16: 31-39.
- Panigrahi, A.K. and Misra, B.N. (1979):** Effect of mercury on the morphology of erthrocytes in Anabas scandens. Bull. Environ. Cont. Toxicol., 23: 784-787.

-
- Parisi, A.F. and Vallee, B.L. (1969): (Quated from Yamaguchi, M. and Yamaguchi R. (1986). Biochem. pharmaco., 35(5) 773-777.) Yamaguchi, M. and Yamaguchi, R. (1986): Action of zinc on base metabolism in rats increases in alkaline phosphatase activity and DNA content., Biochem., Pharma., 35(5): 773-777.
- Pascoe, D. and Beattie, J.H. (1979): Resistance to cadmium by pretreated rainbow trout alevins. J. Fish Biol., 14: 303-308.
- Pascoe, D. and Cram, P. (1977): The effect of parasitism on the toxicity of cadmium to the three-spined stickleback.; Gasterosteus aculeatus L. J. Fish. Biol., 10: 467-472.
- Pascoe, D. and Matthey, D.L. (1977): Studies on the toxicity of cadmium to the three-spined stickleback; Gasterosteus aculeatus L. J. Fish Biol., 11: 207-215.
- Petering, R.G.; Johnson, M.A. and Stemmer (1971): Studies on zinc metabolism in rat. I. Dose response effects of cadmium. Arch. Environ. Health, 23: 93-101.
- Pickering, A.D. (1981): Stress and Fish. New York: Academic Press.
- Pickering, Q.H. and Henderson, C. (1966): The acute toxicity of some heavy metals to different species of warm water fishes. Air Wat. Poll., 10: 453-463.
- Pickford, G.E.; Srivastava, A.K.; Slicher, A.M. and Pang, P.K.T. (1971): The stress response in the abundance of circulating leucocytes in the killifish; Fundulus heteroclitus: I. The cold-shock sequence and the effect of hypophysectomy. J. Exp. Zool., 177: 89-96.
- Poston, H.A. (1966): Effect of water temperature on levels of serum protein components of brown trout. Fish Res. Bull., 19: 25-27.
-

-
- Price (1978):** (Quoted from Slabbert J.L. and Morgan S.G. (1982). Water Res. 16: 517-523.) Slabbert, J.L. and Morgan, S.G. (1982): Abioassay technique using *terahymena pyriformis* for the rapid assessment of toxicants in water. Water. Res., 16: 517-532.
- Price-Haughey, J. and Gedomu, L. (1987):** Heavy metal induced protein synthesis in fish cell lines. Experientia (Suppl.), 52: 465-469.
- Racicot, J.G.; Gaudet, M. and Leray, G. (1975):** Blood and liver enzymes in rainbow trout (*Salmo gairdneri* Rich) with emphasis on their diagnostic use; study of CCl₄ toxicity and a case of *Aeromonas* infection. J.Fish Biol., 7: 825-835.
- Rasmussen, L.E. and Rasmussen, R.A. (1967):** Comparative protein and enzyme profiles of the cerebrospinal fluid, extradural fluid, nervous tissues and sera of elasmobranchs. In skarks, shates and rays (P.W. Gilbert, R.F. Mathewson & D.P. Rall, eds.), PP. 361-379. Baltimore: The Johns Hopkins Press.
- Reeve, M.R. Walter, M.A.; Darcy, K and Ikeda, T. (1977):** Evaluation of potential indicators of sub-lethal toxic stress on marine zooplankton (feeding, fecundity, respiration and excretion): CEPEX. Bull. Mar. Sci., 27(1): 105-113.
- Reltman, S. and Frankel, S. (1957):** A colorimetric method of the determination of serum glutamic oxaloacetic and glutamic pyruvic transaminases. Amer. J. Clin. Path., 28: 53-56.
- Richarek, M.P. and Cousins, R.J. (1975):** Mammalian zinc hemostasis: requirement for RNA and metallothionein synthesis. Biochem. Biophys. Res. Comm., 64: 1215-1233.
-

-
- Robohm, R.A. and Nitkowski, M.F. (1974): Physiological response of the cunner. Tautogolabrus adspersus to cadmium. IV-Effects on the immune system. In physiological response of the cunner; Tautogolabrus adspersus, to cadmium, PP. 15-20, NOAA Tech. Rep. NMFS SSRF-681.
- Rodrigues, A.L.; Bellinaso, M.L. and Dick, T. (1989): Effect of some metal ions on blood and liver delta-aminolevulinate dehydratase of Pimelodus maculatus (Pisces, pimelodidae). Comp. Biochem. Physiol. B., 94(1): 65-9.
- Rodsether, M.C.; Olafsen, J. and Raa, J. (1977): Copper as an initiating factor of vibriosis (Vibrio anguillarum) in eel (Anguilla anguilla) J. Fish Biol., 10: 17-21.
- Ruthven, and Cairn, S. (1973): (Quoted from slabbert J.L. and Morgan S.G. (1982). Water Res., 16: 517-523.) Slabbert, J.L. and Morgan, S.G. (1982): Abioassay technique using *terahymena pyriformis* for the rapid assessment of toxicants in water. Water. Res., 16: 517-532.
- Sadler, K. and Lynam, S. (1988): The influence of calcium on aluminium-induced changes in the growth rate and mortality of brown trout; Salmo trutta L. J. Fish Biol., 33: 171-179.
- Sander, B.G. (1964): Electrophoretic studies of the serum proteins of the three trout species and resulting hybrids within the family Salmonidae. In: Taxonomic biochemistry and serology (C.A.Leone, ed.) PP. 673-679. New York: Roland Press.
- Sayer, M.D.J.; Reader, J.P. and Morris, R. (1991): Embryonic and larval development of brown trout; Salmo trutta L. Exposure to aluminium, copper, lead or zinc in soft acid water. J. Fish Biol., 38: 431-455.
-

-
- Schmidt-Nielsen, B. (1974): Osmoregulation: effect of salinity and heavy metals. Fedn. Am. Soc. Exp. Biol., 33: 2137-2146.
- Schumacher, R.E.; Hamilton, B.H. and Longtin, E.J. (1956): Blood sedimentation rates of brook trout as affected by furunculosis. Progve. Fish Cult., 18: 147-148.
- Schutz, D.F. and Turekian, K.K. (1965): The investigation of the geographical and vertical distribution of several trace elements in sea water using neutron activation analysis. Geochim. Cosmochim. Acta, 29: 259-313.
- Shaw, A.F. (1930): A direct method for counting the leucocytes, thromobocytes and erythrocytes of Bird's blood. J. Path. Bact., 33: 833-835.
- Simon, B.; Sebert, P. and Barthelemy, L. (1991): Eel; Anguilla anguilla L.), muscle modifications induced by long-term exposure to 101 ATA hydrostatic pressure. J. Fish Biol., 38: 89-94.
- Singh, S.M. and Ferns P.N. (1978): Accumulatoion of heavy metals in rainbow trout; Salmo gairdneri (Richardson) maintained on a diet containing activated sewage sludge. J. Fish Biol., 13: 277-286.
- Singley, J.R.; Goetti, J.P. and Davies, P.H. (1974): The effects of zinc on rainbow trout in hard and soft water. Bull. Envn. Contam. Toxicol., 12: 193-201.
- Skidmore, J.F. (1964): Toxicity of zinc compounds to aquatic animals with special reference to fish. Q. Rev. Biol., 39: 227-248.
- Skidmore, J.F. and Tovell, P.W.A. (1972): Toxic effects of zinc sulphate on the gills of rainbow trout. Wat. Res., 6: 217-230.
-

-
- Snieszko, S.J.; Miller, J.A. and Atherton, C.R. (1966): Selected hematological and biochemical tests performed with blood and serum of adult rainbow trout (Salmo gairdneri) with a high incidence of hepatoma. Ann.N.Y. Acad. Sci.,136: 191-210.
- Soivio, A.K.; Westman and Nyholm, K. (1974): Changes in hematocrit values in blood samples treated with and without oxygen: a comparative study with four salmonid species. J. Fish Biol., 6: 763-769.
- Spehar, R.L. (1976): Cadmium and zinc toxicity to flagfish Jordanella floridae. J. Fish Res. Bd. Can., 38: 95-97.
- Sprague, J.B. (1969): Measurment of pollutant toxicity to fish. I. Bioassay methods for acute toxicity. Wat. Res., 3: 793-821.
- Sprey, D.J. and Wood, C.M. (1984): Acid-base, plasma ion and blood gas changes in rainbow trout during short term toxic zinc exposure. J. Comp. Physiol. B., 154: 149-158.
- Srivastava, A.K. and Mishra, S. (1979): Blood dyscrasia in a teleost; Colisa fasciatus after acute exposure to sublethal concentrations of lead. J. Fish Biol., 14: 199-203.
- Stacey, N.H. and Klaassen, C.D. (1981): Copper toxicity in isolated rat hepatocytes. Tox. Appl. Pharmacol., 58: 211-220.
- Stonard, M.D. and Webb, M. (1976): Influence of dietary cadmium on the distribution of the essential metals; copper, zinc and iron in tissues of the rat. Chem. Biol. Interactions., 15: 349-363.
- Thawley, D.G. (1977): Toxic interactions among Pb, Zn. and Cd. with varying levels of dietary Ca and vitamin D. Hematological system. Environ. Res., 14: 463-475.
-

- Thurberg, F.P. and Dawson, M.A. (1974): Physiological response of the cunner; Tautogolabrus adspersus, to cadmium. III changes in osmoregulation and oxygen consumption. In physiological Response of cunner; Tautogolabrus adspersus, to cadmium, PP. 11-13, NOAA Tech. Rep. NMFS SSRF-681.
- Tietz, N. (1976): Fundamentals of clinical chemistry. Philadelphia, London and Toronto: W. B. Saunders (ed.).
- Tietz, N.W. (1987): Fundamentals of clinical chemistry. 3rd ed. W.B. Saunders Company. Philadelphia, London.
- Tort, L. and Torres, P. (1988): The effects of sublethal concentrations of cadmium on haematological parameters in the dogfish; Scyliorhinus canicula. J. Fish Biol., 32: 277-282.
- Underwood, E.J. (1971): Trace elements in human and animals nutrition. 3rd edition P. 208. Academic Press, New York.
- Urist, M.R. and VanDePutte, K.A. (1976): Comparative biochemistry of the blood of fishes. In Sharks, skates and rays (P.W. Gilbert, R.F. Mathewson & D. P. Rall, eds.), PP. 271-285. Baltimore: the Johnso Hopkinspress.
- Uthe, J.F.; Alton, F.M. and Royer, L.M. (1973): Uptake of mercury by caged rainbow trout; (Salmo gairdneri) in the south saskatchewan River. J. Fish Res. Bd. Can., 30: 643-650.
- Vogel, F.S. and Kemper, L. (1966): An intramitochondrial polypeptide with story chelating properties for copper: an agent that monitors cytotoxicity, Amer. J. Path., 48: 713-719.

-
- Voyer, R.A.; Yevich, P.P. and Barszcz, C.A. (1975): Histological and toxicological responses of the mummichog; Fundulus heteroclitus (L.) to combination levels of cadmium and dissolved oxygen in freshwater. Wat. Res., 9: 1069-1074.
- Wagh, S.B.; Khalid, S. and Shakila, S. (1985): Acute toxicity of cadmium sulphate, zinc sulphate and copper sulphate to Burbus ticto: Effect of oxygen consumption and gill histology. J. Environ. Biol., 6(4): 287-293.
- Waiwood, K.G. (1980): Changes in hematocrit of rainbow trout exposed to various combinations of water hardness, pH and copper. Trans. Am. Fish. Soc., 109: 461-463.
- Waiwood, K.G. and Beamish, F.W.H. (1978): The effect of copper, hardness and pH on the growth of rainbow trout; Salmo gairdneri. J. Fish Biol., 13: 591-598.
- Waldichuk, M. (1979): Review of the problems. In The Assessment Of Sublethal Effects Of Pollutants In the Sea (H.A. Cole, Ed.) Phil. Trans. R.Soc. Lond., B. 286: 399-424.
- Wallace, R.A. and Selman, K. (1979): Physiological aspects of oogenesis in two species of sticklebacks.; Gasterosteus aculeatus L. and Apeltes quadracus (Mitchill). J. Fish Biol., 14: 551-564.
- Weatherley, A.H.; Beevers, J.R. and Lake, P.S. (1967): The ecology of a zinc polluted river. In Australian Inland Waters and Their Fauna. Eleven studies. (Ed. A.H. Weatherly) PP. 252-78. (ANU Press: Canberra).

- Weber D.N., Eisch S., Spieler R.E. and Petering D.H. (1992): Metal redistribution in large mouth bass (Micropterus salmoides) in response to restraint stress and dietary cadmium role of metallothionein and other metal-binding proteins. *Comp. Biochem. Physiol. C.*, 101(2): 255-262.
- Weber, L.J.; Gingerich, W.H. and Pfeifer, K.F. (1979): Alterations in rainbow trout liver function and body fluids following treatment with carbontetrachloride and monochlorobenzene. *Am. Chem. soc. Symp. Ser.*, 99: 401-413.
- Wedemeyer, G.A. and McLeay, D.J. (1981): Methods of determining tolerance of fishes to environmental stressors. In stress and fish (A.D. Pickering, ed.), PP. 247-275. New York: Academic Press.
- Wei, D. and Androws, G.K. (1988): Molecular cloning of chicken metallothionein deduction of the complete amino acid sequence and analysis of expression using cloned complementary DNA *Nucleic acids. Res.*, 16: 531-554.
- Weichselbaum, T.E. (1946): An accurate and rapid method for determination of proteins in small amounts of blood serum and plasma., *Am. J. Clin. Path.*, 16: 40-44.
- Weight, P.A.L.; Dewar, W.A. and Saunderson, C.L. (1986): Zinc toxicity in the fowl: ultrastructural pathology and relationship to selenium, lead and copper. *Avian. Path.*, 15: 23-38.
- Weis, J.S. and Weis, P. (1977): Effects of heavy metals on development the killifish; Fundulus heteroclitus. *J. Fish Biol.*, 11: 49-54.