

Environmental Management

9204-001. Aggarwal G D (Envirotech Int, A239, Okhla Indl Area, Phase I, New Delhi). **Environmental impacts of industrial units: assessment how and by whom.** *J Indl Polln Contl*, **8** (1) (1992), 37-43.

Paper examines various facets of Environment Impact Assessment of industrial units considering the prevailing conditions in the industries, background data available, microclimatic differences etc. It is equally important to consider for whom environment impact assessment is conducted and who are the decision makers.

9204-002. Awasthi Ajay K, Parmar SPS (Sch Environ Bio, APS Univ, Rewa 486004). **Environmental impact profile of Dalda Vanaspati Sayantra, Sarra, Sidhi (M.P.).** *Proc Acadl Environ Bio*, **1** (2) (1992), 187-193 [15 Ref].

The current study highlights various environmental impacts caused and also those likely to be caused by the establishment of Dalda Vanaspati Sayantra. It is concluded from the Environmental Impact Assessment (EIA) study of over all value (42.84) obtained either total of vertical columns or horizontal columns in expression of negative impact. The value (42.84) reveal that the establishment of the factory and related activities would impact the environmental system in immediate future negatively.

9204-003. Chakraborti D (Sch Environ Std, Dept Chem, Jadavpur Univ' Calcutta 700032). **Gas chromatography atomic absorption spectrometry (GCAAS) for species specific determination of organo lead compounds in the environment.** *Cheml Environ Res*, **1** (1) (1992), 3-12 [54 Ref].

The combined instrumental technique, gas chromatography atomic absorption (GCAAS) has been found most suitable for tetra-alkyllead (TAL) and ionic alkyllead determination in environmental samples. The recent GCAAS technique after derivatization of the ionic alkyllead compounds to their butyl homologues has overcome previous difficulties.

9204-004. Datta B, Datta A (ConsultingEngngServices (I) Pvt Ltd, 5th Floor, 57, Nehru Place, New Delhi 110019). **ELA of gas and coal based thermal projects: case studies.** *J Indian Assoc Environ Manag*, **18** (3) (1991), 236-241 [8 Ref].

Two EIA case studies have been presented: for one coal based power project (CPP) and one gas based power project (GPP); both located on sea coast to demonstrate environmental impacts on airquality, soil and geohydrology and aquatic ecology. It is observed that leachate; soil ground water interactions; changes in aquatic ecosystem with particular reference to migrating varieties. On the other hand, it is observed that although a GPP is considered to be a clean technology, impact on air quality due to resultant NOx concentration could be significant. The case studies also show certain limitations of the present EIA methodology.

9204-005. Dey Avijit, Sen Gupta Bhaskar (Dept Cheml Engng, Jadavpur Univ, Calcutta 700032). **Pollution abatement in the Indian pulp and paper industry.** *The Environmentalist*, **12** (2) (1992), 123-129 [14 Ref].

Pollutants in air, water and as solids which stem from the paper industry are discussed, and pollution abatement measures are suggested. This paper reviews some emerging international principles which are effective in reducing both effluent treatment costs per tonne of paper and the mill discharges, to levels where their environmental impacts become far less significant than at present.

9204-006. Kumarswamy K (Sch Earth Sci, Bharathidasan Univ, Tiruchirapalli 620023). **Method of studying salt water intrusion a case study in the Coromandal coastal aquifers.** *The Deccan Geographer*. **29** (1) (1991) 15-19 [7 Ref] [Late pub].

Geophysical, geochemical, social survey and geohydrological analyses were carried out to diagnose the problem in the Vaippar coastal estuarine tract of Coromandal coast. Based on the study, the salt affected areas in other parts of Indian coast can be easily classified and delimited for planning and management of vital coastal resources.

9204-007. Lakshmi Ahana (Cent Environ Std, Anna Univ, Madras 600025). **Approaches to environmental literacy.** *J Indian Assoc Environ Manag*, **18**(3) (1991), 230-235 [7 Ref].

Environmental literacy indicates ability to understand and systematically and critically evaluate the causes and effects of man's actions resulting in the degradation of our surroundings. Development should be "people centred". The key for this is the participation, organization, education and empowerment of the people. The root causes of environmental problems and different approaches to environmental education are discussed.

9204-008. Negi SS (HP Forest Trng Sch, Chail 173217 H.P.). **Forestry education and training in India a review.** *Indian J Forestry*, **15** (2) (1992), 103-110[4 Ref].

Forestry education and training in India is over 110 years old. This article discusses its development over these years. The changing scenario and its present status has been dealt with in detail. Suggestions have been given for linking forestry education and training in India.

9204-009. Samant J S, Bhalerao RJ (Sch Environ Sci, Shivaji Univ, Kolhapur 416004). **Role of youth in environmental education for sustainable industrial development.** *J Indian Assoc Environ Manag*, **18** (3) (1991), 227-229.

Efforts are being made to transform the backward regions in the country by installing new industries of varied nature and magnitudes. It hence becomes critical than ever to understand the environmental degradation likely to take place in the region. With proper educational planning, school and college going youth can be successfully exposed to the current environmental issues at local and regional levels.

9204-010. Saxena Naresh C (15 A, Clive Road, Allahabad 211001). **Farm forestry and land use in India: some policy issues.** *Ambio*, **2** (6) (1992), 420-425 [34 Ref].

Farm forestry was promoted in India in the late 1970s to produce fuel wood for rural consumption. The program was immensely successful in the green revolution regions in the early 1980s, but farmers produced wood for markets, and not to meet local needs. This paper analyzes the likely causes for its limited success, and suggests that while market led farm forestry may continue without subsidies on a reduced scale, government attention should shift to strengthening the traditional agroforestry practices based on indigenous species.

9204-011. ShrivastavaA, Tripathi N, SarinR (Natl Environ Engng Res Inst, Nagpur 440020). **Conceptual use of indifference curves in environment impact assessment.** *Asian Env*, **14** (2) (1992), 73-78[2 Ref].

A conceptual use of indifference curves, defines as functionality between development index and pollution loads, to evaluate environmental impacts is proposed. Existing Battelle environmental evaluation methodology is subjective in its approach. It has been shown that use of indifference curves lends a more objective approach to environment assessment methodology.

9204-012. Shrivastava Asheem K (Indira Gandhi Natl Forest Acad. New Forest, Dehra Dun UP). **Strategy for wasteland afforestation in Gujarat.** *The Indian Forester*, **118** (9) (1992), 623-629.

The State of Gujarat according to the present estimates has nearly 8 million hectares of wasted lands. In order to meet the future challenges it is imperative that the productivity of lands must be improved in such a manner that is economically feasible and socially acceptable. Besides sound technical land use planning, other aspects like resource proximity, cost, distribution pattern etc. will have to be taken into consideration in near future. The present paper discusses the strategy that may be adopted for meeting the fuel wood requirement and also the equitable distribution to different sections of the society.

9204-013. Shrivastava A K Gupta B N, Bihari V (Indl Toxic Res Cent, Epidemio Div, Mahatma Gandhi Marg, Lucknow 226001). **Health of workers in Uttar Pradesh current status.** *Indian J Environ Prot*, **12** (7) (1992), 515-520 [39 Ref].

The checks required to protect the labour force from work related infirmities has not kept pace with industrialisation. Present article is an effort to sum up this important aspect so as to provoke action in this context for protecting and promoting the health of this productive group of population.

9204-014. Subramanian T V (Anna Univ, AC Coll Techno, Madras 600025). **Hazard assessment and prevention methodologies.** *Indian J Environ Prot*, **12** (4) (1992), 285-290.

The methods of preventing a hazard is based on the understanding of the hazard and then the methodologies will have to be evolved for mitigating the hazard to preserve national resources or to evolve a plan of action for future methodologies for preventing such catastrophies. Paper presents a detailed question and answer for evolving methodology for safe design and industrial safety.

9204-015. Tiwaree R S, BhargavaDS (UnivRoorkee, Dept Civil Engng, Roorkee 247667). **Trace metals (Cd, Pb and Hg) in the environment.** *Indian J Environ Prot*, **12** (4) (1992), 241-250.

The concentration of the trace/ toxic/heavy metals is continuously increasing in our environment and has become more noticeable after an intensive industrial development. The environment close to the industrial sectors is therefore, more vulnerable to contamination from the trace metals. An account of the properties, origins, adverse effects and control measures for the stated trace metals has been included in this paper.

9204-016. Toky O P, Bishat R P, Hooda M S (Dept Forestry, Hisar Agricl Univ, Hisar 125009). **Role of remote sensing techniques in study and management of forest ecosystems.** *Myforest*, **28** (2)(1992), 169-174[18 Ref].

During the twentieth century, there had been large scale degradation of forests in India due to shifting agriculture in northeastern parts, and use to many fold increased demand of fuel, fodder and timber in other parts of the country. Forest resources of India and the problems associated with them, have been described and the role of remote sensing in the study of forest communities have been discussed.

9204-017. Tripathi N, Shrivastava A, Sarin R (Natl Environ Engng Res Inst, Nagpur440020). **Role of environmental audit in environment management by industries.** *J Indian Assoc Environ Manag*, **18** (3) (1991), 242-244.

The paper puts forward the objectives and benefits of an internal environmental audit and suggests that such a programme be planned and incorporated into the internal management of all industries as the regular and proper implementation of this practice will help in reducing this and potential liabilities.

Air Pollution

9204-018. Agrawal K M, Kulkarni V S (Indian Inst Port Manag, 40, Circular Garden Reach Road, Calcutta 700043). **Comparative study on prevalence of atmospheric stability classes as determined by select methods.** *Indian J Environ Prot*, **12** (6)(1992), 431-438 [18 Ref].

Atmospheric stability play a key role in air quality simulation modelling. Magnitude of ground level concentration (GLCs) primarily depends on dispersion coefficients which are estimated as the function of atmospheric stability. Three most common methodologies used for estimation of atmospheric stability classes has been compared. The study revealed that the results vary upto 142% in terms of predominance of stability classes.

9204-019. Agarwal Madhoolika (Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Ozone: sources and interactions with other pollutants.** *Ecology*, **6** (11) (1992), 22-23 [15 Ref].

Article discusses sources and effects of ozone as phytotoxic air pollutant. Ozone in troposphere is originated from three major sources. Effects of interaction of ozone with other pollutants viz. SO₂ and O₂ as well as NO₂ and O₃ and their phytotoxicity with specific reference to bio-mass and primary productivity have been discussed in the light of relevant literature.

9204-020. Basu B, Tuli DK, Jain SK and Bhatnagar AK (Indian Oil Corpn Ltd, Res Dev Cent, Sector 13, Faridabad 121007). **Application of modern analytical techniques for monitoring atmospheric pollution a review, Part I.** *Indian J Environ Prot*, **12** (6) (1992), 416-430 [254 Ref].

Literature on application of modern analytical techniques for monitoring atmospheric pollution with specific reference to transportation (vehicular emission) and petroleum and petrochemical industry has been reviewed. Chromatographic techniques including GC, MS and FTIR have been covered.

9204-021. Chakrabarty Shibnath (Civil Engng Dept, Jadavpur Univ, Calcutta). **The greenhouse effect and an accounting system of greenhouse gas emissions.** *J Inst Publ Hlth Engrs, India.* **1992** (1) (1992), 111-120 [Ref].

A global accounting system of greenhouse gas emissions is needed as a part of the overall process of managing the serious problem of climate change. Controversy exists over the proper aims and use of such systems, how the effect of various gases should be assessed, how past emission should be treated and whether accounts should tally per capita, per dollar, per nation or per land area. A few possible approaches are described and discussed here and it is found none is perfect yet but it is found that greenhouse index based on greenhouse forcing contribution (GFC) is a useful measure of greenhouse gas emission as are for many purposes, global warming potential (GWP) based indices.

9204-022. Gupta B N, Bihari Vipin, Srivastava AK (Indl Toxicol Res Cent, Mahatma Gandhi Marg, PB No 80, Lucknow 226001). **Indoor air pollution a review.** *Indian J Environ Prot,* **12** (5) (1992), 352-358 [54 Ref].

Many of the emerging health problems are attributable to substances like tobacco smoke, combustion products, formaldehyde ozone and a number of biological pollutants present in human dwellings. Further, the use of newer building materials and increasing use of various synthetic furnishings call for a detailed review of pollutants present in these environments. The present article is an effort to review the state of the art in respect of this important problem.

9204-023. Jamal A, Dhar B B, Ratan S (Dept Mining Engrs, Inst Techno, Banaras Hindu Univ, Varanasi 221005). **Characterisation of airborne dust in open cast coal mine.** *Asian Env,* **14**(2) (1992), 61-72 [4 Ref].

Studies were conducted to investigate the characteristics of dust produced during various operations in an open cast coal mine. It has been observed that, among the

various dust generating sources, transportation of the material at haulage roads is the main source of respirable size dust, whereas, drilling operation has lesser percentage of respirable fraction. In residential area, percentage of respirable size particles is higher in comparison to active mining area.

9204-024. Lal M, Bhaskaran B (Cent Atmospheric Sci, Indian Inst Techno, New Delhi 1100 1 6). **Greenhouse warming over Indian sub-continent.** *Proc Indian Acad Sci (Earth Planet Sci)*, **101** (1) (1992), 13-25 [12 Ref].

A hierarchy of climate models have been developed and applied to the problem of doubling the CO₂ concentration in the atmosphere. Currently available general circulation models include the most complete treatment of the global warming and are capable of providing changes in several of the meteorological parameters in time scales of half a century. This paper attempt to describe the response of the National Centre for Atmospheric Research Climate Community Model (NCAR CCM) whose performance for northern hemisphere climate simulations was reported to be very satisfactory to Indian region. The seasonal (winter and summer) changes in surface temperature, rainfall and soil moisture from model output statistics are discussed. A probable scenario for sea level rise along the Indian coast line by the year 2030AD as a result of ocean water's expansion due to global warming is outlined.

9204-025. Maji C S, Sen P K (Environ Engng Div MECON (I) Ltd, Ranchi 834002). **Green house effect: causes, consequences and controls.** *J Indian Assoc Environ Manag*, **18** (3) (1992), 245-252[30 Ref].

An attempt has been made to highlight the various causes and consequences of greenhouse effect (GHE). The possible control and alternatives of energy sources and substitutes for chlorofluorocarbons, which will limit the emission of pollutant gases in particular, and protect the environment from the GHE, have also been covered. Paper also covers the world's concern over the greenhouse effect and steps taken in this direction to control the GHE by various international and national agencies like the World Bank, the United Nations, the European Community etc.

9204-026. Mukhertee S, RayMK (DevConsultantsLtd, Enviro protection Div, 29 B, Park Street, Calcutta 700016). **Measurements of nitrogen dioxide in ambient air problems and consequences.** *Indian J Environ Prot*, **12** (4) (1992), 266-271 [9 Ref].

An ambiguous picture has been highlighted in connection with the practice of ambient NO₂ monitoring and analysis as practiced in the country. Discrepancies have been presented regarding the lower limit of detection, the suitability of the methods used, the justification on the duration of sampling recommended and their consequences on the adoption of pollution control strategies.

9204-027. Naik MedhaS (Indian Inst Trop Meteorol, Pune 411008). **Dispersion of sulphur dioxide around the thermal power plant at Ahmedabad, India.** *Atmospheric Env*, **26B** (3) (1992), 331338 [15 Ref].

Air quality due to the release of sulphurdioxide from the thermal power plant within the city limits of Ahmedabad has been computed employing a point, area and line dispersion model. To estimate probable air quality, the meteorological data for 3 consecutive days in the middle of each month of 1983 is used. The concentration of sulphur dioxide is computed at a distance of every 500 m in 16 directions up to the city limit. The air quality in the worst case is estimated in downwind distances under unfavourable meteorological conditions.

9204-028. Pandey Jitender, Agarwal Madhoolika (Cent Adv Std Bot, Banaras Hindu Univ, Varanasi221005). **Ozone: concentration variabilities in a seasonally dry tropical climate.** *Env Int*, **18**(5)(1992), 515-520 [12 Ref].

Paper reports seasonal and diurnal variations in the ambient air concentrations of ozone in Varanasi city, India for the years 1989 and 1990. Different monitoring zones were established in the city on the basis of pollution sources, traffic densities, and structure of built up areas. At most of the monitoring stations, two hourly ozone concentrations frequently exceeded 60 $\mu\text{g m}^{-3}$ (0.03 ppm) during summer months. However, the zone dominated by residential colonies, offices, and cultivated land showed maximum O₃ concentration less than 60 $\mu\text{g m}^{-3}$ (0.03 ppm).

9204-029. Sagane S K. **Maharashtra's experience in auto pollution control.** *Encology*, **6** (10) (1992), 23-28.

Various measures taken up by Government of Maharashtra for control of automobile pollution as well as suggestions to prevent and control the same are discussed. The pollution control acts and rules as well as monitoring of pollution control levels by appropriate authorities have not been found effective, unless they are supplemented by voluntary involvement of public, vehicle users, manufacturers, State Pollution Control Boards, traffic control authorities etc. Mass awareness through media, TV, Radio, audiovisuals and film shows as well as use of battery buses by certain agencies is advocated.

9204-030. Saxena A, Kulshreshta U C, Kumar N, Kirmani K M, Srivastava S S (Dept Chem, Fac Sci, Dayalbagh Educational Inst, Dayalbagh, Agra 282005). **Dry deposition of nitrate and sulphate on surrogate surfaces.** *Env Int*, **18** (5) (1992), 509-513 [23 Ref].

Airborne velocities and deposition fluxes (DF) of NO_3^{-1} and SO_4^{-3} on various surrogate surfaces, specifically petridishes of polypropylene and glass, marble slabs, ceramic tiles, and stainless steel plates, were measured between January and June, 1991. DF's were higher in the summer months, but varied with the surface, decreasing in the order above. In the summer, NO_3^{-1} DFs were higher than corresponding SO_4^{-1} values. In the winter, this trend was reversed.

9204-031. Shaikh A N, Muraleedharan T S, Ramachandran TV, Subba Ramu MC (Environ Assessment Div, Bhabha Atom Res Cent, Bombay 400005). **Estimation of ventilation rates in dwellings.** *Sci Total Env*, **121** (1&2), 67-76 [14 Ref].

Several methods using gaseous tracers such as nitrous oxide, or the radioactive tracer ^{85}K have been used for estimating ventilation rates in rooms. This paper presents a method to evaluate the ventilation rate using radon daughter aerosol normally present in a room as a tracer. By using solid state nuclear track detectors (SSNTD), radon and its progeny levels are determined. For a steady state level of radon and its daughter concentrations, the ratio of working level (WL) to radon is estimated.

9204-032. Sharma Parveen Kumar, Singh Gurdeep (Cent Mining Env, Indian Sch Mines, Dhanbad). **Distribution of suspended particulate matter with trace element composition and appointment of possible sources in the Ranigans Coalfield, India.** *Environ Monit Assessment*, **22** (3) (1992), 237-244 [20 Ref].

Ambient air monitoring for suspended particulate matter was carried over a period of one year in some coal mining areas of the Raniganj Coalfield. Concentrations of seven elements in suspended particulate matter were determined. The set of data obtained was analysed to determine the sources of trace elements by factor analysis. The data could be interpreted on the basis of five factors. These factors are attributed to various sources of particulate matter by noting the dependence of factors on the elements.

9204-033. Thakre Rekha, Aggarwal AL (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Rational for monitoring RSPM in urban environment.** *Indian J Environ Prot*, **12** (7) (1992), 493-496 [7 Ref].

Air quality status in Indian environment is dominated by SPM causing great concern to environmental planners. It is very essential to understand RSPM fraction in the total SPM which is the actual trouble shooter from health point of view. Sources of RSPM are highlighted and a need for monitoring RSPM standards in India have been stressed.

9204-034. Varma G S (DGM Office, Mausam Bhawan, Lodi Road, New Delhi 110003). **Rain acidification in India caused by nitrates.** *Atmosfera*, **5** (4) (1992), 233-239 [26 Ref].

The contribution in rain acidification caused by the oxides of nitrogen which are further oxidised to nitrates and subsequently release of hydrogen ions in the atmosphere while reacting with rain droplets has been studied from the period 1976 to 1987 using the data of ten BAPMON stations of India. It was observed that there exists a significantly strong inverse correlation between the rainfall pH and the corresponding concentration of nitrates at about 1% L. S. which indicates that rapid decrease in rain pH in India is mainly caused by the sudden increase in nitrate radicals which are formed by the oxidation of nitrogen oxides which are the ultimate outcome of automobile pollution caused by the rise in vehicular population in India.

9204-035. Varshney C K, Aggarwal Maneesha (Sch Environ Sci, Jawaharlal Nehru Univ, New Delhi 110007). **Ozone pollution in the urban atmosphere of Delhi.** *Atmospheric Env*, **26B** (3) (1992), 291-294 [9 Ref].

Measurements of ozone in the urban environment of Delhi were carried out synoptically at four different sites during 1989-1990. The amount of ozone in the ambient air varied from 9.4 to 128.31 ppb exhibiting wide temporal and seasonal variation. The ozone concentration invariably peaked at noontime and remained high during early summer and spring periods. The results of the study show that there is a significant build up of tropospheric ozone in the urban environment of Delhi.

Water Pollution

9204-036. Anila Kumary K S, AbdulAziz PK (Dept Aquatic Bio Fisheries, Univ Kerala, Thiruvananthapuram 695007). **Water quality of the Poonthura estuary, Thiruvananthapuram.** *Mahasagar*, **25** (1) (1992), 1-9 [20 Ref].

The Poonthura estuary was monitored for its water quality from February 1991 to September 1991. Light penetration was minimum during the monsoon period and the lowest values were observed at stations receiving large quantities of sewage wastes. pH was maximum during the premonsoon period and showed a distinct stratification. High sulphide content was observed at the polluted stations especially during the premonsoon period.

9204-037. Arulanancham A, Ramakrishna TV, Balasubramanian N [Indian InstTechno, Dept Chem, Madras 600036). **Studies on fluoride removal by coconut shell carbon.** *Indian J Environ Prot*, **12** (7) (1992) 531-536 [14 Ref].

The activated carbon prepared by carbonisation of coconut shell in the presence of sulphuric acid was used for the removal of fluoride after impregnation with Al^{3+} ions. The developed carbon after impregnation Al^{3+} ion when used in wet condition showed a capacity for fluoride removal three times higher than the same material used after drying the carbon.

9204-038. Bhargava Devendra Swaroop (Dept Civil Engng, Univ Roorkee, Roorkee, UP 247667). **Why the Ganga (Ganges) could not be cleaned.** *Environ Conserv*, **19** (2) (1992), 170-172 [28 Ref].

Some of the important factors leading to lapses in the implementation of Ganga Action Plan" have been discussed in the present paper. Wasteful expenditure on Ganga water quality surveys, which were carried out by personnel with very little technological background, or knowledge of objectives and technology of such surveys has been one of the factor; besides several serious technological and scientific faults and numerous shortcomings in the water quality management strategies and programmes such as faulty effluents standards, lack of priority or wisdom from drain diversions, non judicious

use of money and involvement of personnel in top managerial positions posted against are some of the factors for this failure.

9204-039. Chacharkar M P, WadhawanAK, SinghD, SoniNK, Bairwa S P (Raksha Prayogshala, Jodhpur 342041). **Some rare elements in groundwater of Rajasthan.** *Indian J Environ Prot*, **12**(6) (1992), 445-450[8 Ref].

Underground waters in western Rajasthan were surveyed to investigate the presence of any novel metal ions. X-ray fluorescence analysis with total multiple Reflection energy dispersive X-ray fluorescence analyser was carried out using cobalt as internal standard. 21 groundwater samples from Jodhpur and Jaisalmer district were analysed after getting rid of the suspended matter. The profile of the accessible element is different for groundwater as compared with the surface waters and strategies for community water supply needs to account for these ions while planning.

9204-040. Dayal Gopal (Dept Chem, St. John's Coll Agra 282002). **Groundwater qualities of rural and urban settlements at Agra.** *J Nature Conserv*, **4**(1)(1992), 89-93 [17 Ref].

A detailed investigation was carried out to ascertain the degree of contamination of groundwater in Agra, both urban and rural areas. The investigations indicated a high degree of pollution in groundwaters of Agra city. Though much of the variables were within the standard limit of potable water, a few heavy metals recorded a concentration much beyond the permissible limits set by the WHO (1984). The water sources around septic tanks and sewage channels showed a high contamination of coliforms.

9204-041. Deo Namita, Ali Manzoor (Regl Engng Coll, Dept Chem, Rourkela 769008). **Use of a low cost material as an adsorbent in removal of Cr (VI) from dilute aqueous solution.** *Indian J Environ Prot*. **12** (6) (1992), 437-444 [13 Ref].

The ability of a low cost adsorbent material in removal of heavy metal ions Cr(VI) from aqueous solution was successfully investigated. The material, paddy straw was found to be effective and was capable of removing completely the Cr(VI) from dilute aqueous solution. However, at higher initial concentration of Cr(VI) the percent removal was low. The method, effective under normal condition needs no adjustment of pH and is cheap and convenient.

9204-042. Gaur Komal K (Dept Reproductive Bio, All India Inst Medl Sci, Ansari Nagar, New Delhi 110029). **Physicochemical and biological characteristics of Keetham lake.** *J Nature Conserv*, **4** (1) (1992) 35-39 [15 Ref].

The studies on physical and biological examination of the water of Keetham lake were carried out from October, 1986 to May, 1987 with reference to the distribution of phyto and zooplankton population. It has been concluded that the raw water supply from this source is fit for industrial as well as for potable purposes.

9204-043. Ghosh Shampa, Bhattacharya Shelley (Environ Toxicol Lab, Dept Zoo, Visva Bharati Univ, Shantiniketan 731235). **Elevation of C reactive protein in serum of Channa punctatus as an indicator of water pollution.** *Indian J Exptl Bio*, **30** (8) (1992), 736-737 [17 Ref].

Effect of some pollutants like heavy metals, nonmetals and pesticides on the circulating level of C reactive protein (CRP) which is an acute phase plasma protein was studied in a freshwater murrel *Channa punctatus*. Fish was exposed to non lethal doses of these xenobiotics which were apparently safe. But the level of CRP detected by sensitive single radial immunodiffusion (SRID) technique showed that within 12hr of exposure the non-lethal doses of xenobiotics could initiate the acute phase response in terms of elevated CRP titre. Heavy metals caused the acute phase within 24 hr, nonmetals and Metacid50 within 48 hr exposure.

9204-044. Hegde SN, Puranik SC (Dept Std Dev, Karnatak Univ, Dharwar 580003). **Trace elements in groundwaters of Hubli city, Karnataka, India.** *Curr Sci* **63** (1) (1992), 43-45 [13 Ref].

Twentytwo ground water samples from Hubli city, Dharwad district Karnataka, have been analysed for Fe, Mn, Cu, Ni, Pb and Cd. High concentration of toxic elements, viz. Pb and Cd, is noticed in a few samples. The probable sources for these elements are industries and also highway contamination. Immediate quality monitoring of groundwater is suggested in this area.

9204-045. Kale V S, Pawar N J, Gupta S C (Dept Geo, Univ Poona, Pune 411007). **Geochemical assessment of water quality of a perennial stream from semiarid Maharashtra for human consumption and irrigation.** *Cheml Environ Res*, **1** (1) (1992), 79-86 [11 Ref].

Study assess the water quality of a small perennial stream in the severely droughtprone area of Maharashtra State. Data were collected for four sample stations covering a period of seven months to evaluate the geochemical properties of the streamwater for human consumption and irrigation. The study reveals at a station as well as downstream variation in the tonic concentration of the stream water. The water is unsafe for human consumption near the spring.

9204-046. Kannan N, Rajasekaran N, Ganesan S P (Ayya Nadar Janaki Ammal Coll, P G Dept Chem, Sivakasi 626124). **Correlations among water quality parameters: acceptability of a FORTRAN programme for correlation analysis of pollution parameters.** *Indian J Environ Prot*, **12** (4) (1992), 259-265 [9 Ref].

The correlation coefficient (r) between all the possible pairs of water quality parameters and the linear regression equation of the type: $YA+BX$ for statistically significant correlation ($r > 0.70$) alongwith the estimated values are computed for various systems (samples). For this purpose a general programme for correlation analysis of pollution parameters in FOKTRAN language has been developed and found to be applicable to various systems.

9204-047. Karunagaran V M, Subramanian A N (Cent Adv Std MarineBio, AnnamalaiUniv, Parangipettai 608502). **Fluoride pollution in the Uppanar estuary, Cuddalore, South India.** *Marine Polln Bull*, **24** (10) (1992), 515-517 [10 Ref].

Studies on fluoride distribution and the quantitative load of fluoride entering the Uppanar (Paravanar) estuary, Cuddalore, on the Southeast coast of India, showed reduction of fluoride concentration in the wastewater after alkali treatment. The source of fluoride contamination in waste water from the SIPCOT facility is believed to be a chemical industry manufacturing various compounds, leading to elevated levels of fluoride in the groundwater of villages close to the SIPCOT complex. The overall impact

depends on the relationship between wastewater volumes and receiving water mixing characteristics.

9204-048. Kaur A, Pallah B S, Sahota G P S, Sahota H S (Dept Chem, Punjabi Univ, Patiala 147002). **Seasonal variability of chemical parameters in drinking water from shallow aquifers.** *Indian J Environ Prot*, **12**(6) (1992), 409-415 [16 Ref].

Present study has been made to investigate seasonal variations of various water quality parameters and to investigate correlations amongst them. Bicarbonates, chlorides, electrical conductivity, pH, sulphates and total hardness show a downward trend in their concentrations from April to June (summer season) whereas their concentrations increase during August to October due to monsoon rains, indicating potential for contamination due to acid rain.

9204-049. Kaveeshwar Rachana, Cherian Lata, Gupta V K (Dept Chem, Ravishankar Univ, Raipur 492010, M P). **A field test method for the detection of zinc in environmental samples.** *Asian Env*, **14** (1) (1992), 3-7[14 Ref].

In the present communication a simple field test for the detection of zinc is described. The test is based on the redox reaction between 1-naphthyl (ethylene) diamine dihydrochloride (NEDA) and hexacyanoferrate (III) in presence of zinc as catalyst. This sensitive reaction has been successfully applied for the detection of zinc in polluted water and biological samples. The limit of identification and dilution limit were found to be 0.1g Zn and 1: 5, 000, 000 respectively.

9204-050. Mandal Debashis, Mukhopadhyay S (Dept Plant Patho, Bidhan Chandra Krishi Vishwavidyalaya, Kalyani 741285). **Incidence of coliphages in the Ganga water and in its sewage outfalls around Calcutta an approach towards biological monitoring of water pollution.** *Sci Cult*, **57** (8&9) (1992), 201-203 [3 Ref].

Practical utility of incidence of coliphage and coliform bacteria along the sewage channel at Calcutta has been assessed. The levels of coliphage and coliform bacteria did not change much at various sites along a sewage channel. However, they were found to increase in circular canal, Baghbazar, and sewage channel near Vivekananda Setu, Dakshineswar. They were more abundant in bathing ghats and their population showed rise during post monsoon months.

9204-051. Mohapatra S P, Saxena S K, Ali Arif (Jamia Millia Islamia Univ, Cent Bio Sci, New Delhi 110025). **Occurrence of coliform bacteria in channels receiving municipal sewage.** *Indian J Environ Prot*, **12** (7) (1992), 509-511 [12 Ref].

A major part of municipal effluents are discharged untreated to various channels in Delhi. Total coliform and faecal coliform bacteria in water from two channels at Okhla in the southern part of Delhi were monitored for one year to assess the water quality in the channels. Both the channels were found to be infected with high count of coliform bacteria. Total coliform and faecal coliform counts had the highest values in the month of March while the lowest values were obtained in December.

9204-052. Nigam P C, Prasad S (Dept Chem, Manipur Univ, Imphal 795003). **Kinetic methods for trace analysis based on uncatalysed ligand substitution reactions on complex formation reactions.** *Cheml Environ Res*, **1** (1) (1992) 13-21 [44 Ref].

This review covers salient features of a methodology called the "Kinetic Methods of Analysis applied to trace determination of inorganic or organic species present singly or as components of closely related mixtures in a variety of complex matrices. The discussion is limited to the use of uncatalysed ligand substitution or complex formation reactions.

9204-053. Parrllar M L, GuptaV K(Dept Chem, Himachal Pradesh Univ, Shimla 171005). **Solute movement through porous medium hydrodynamics permeability of water and aqueous solutions of urea, manganese, copper and zinc sulphate across a leached soil interface.** *Cheml Environ Res*, **1** (1) (1992), 41-52 [12 Ref].

Results on hydrodynamic permeability for water and aqueous solutions of urea, and sulphates of manganese, copper and zinc across a soil (sandy loam) sample interface of known thickness at 303K are reported. The data have been analysed in terms of the principles of irreversible thermodynamics. The permeability coefficient L has been evaluated for various solutions.

9204-054. Parmar P G, Patel S K, Modyl C (Dept Life Sci, Bhavnagar Univ, Bhavnagar 364002). **Physicochemical and bacteriological properties of filtered drinking water and its purification system from Bhavnagar (Gujarat).** *Proc Acad Environ Bio*, **1** (2) (1992), 141-146 [6 Ref].

An assessment of quality of drinking water standard and its purification system of Bhavnagar city (Gujarat, India) was made in respect to certain physicochemical and bacteriological parameters, i.e. colour, odour, temperature, pH, turbidity, electrical conductivity, solids, acidity, alkalinity, total hardness, chlorides, calcium, magnesium, bicarbonates, standard plate count coliform group etc. All the tested constituents were within the permissible limits.

9204-055. Parmar P C, Patel S K, Mody I C (Dept Life Sci, Bhavnagar Univ, Bhavnagar 364002). **Physicochemical and bacteriological study of water of Bhavnagar municipal public swimming pool and its purification system.** *Proc Acad Environ Bio*, **1** (2) (1992), 179-185 [6 Ref].

An assessment of water quality of swimming pool and its purification system, run by Bhavnagar city Municipal Corporation, with respect of certain physicochemical and bacteriological examination was made. The results were compared with water standards of I.S. which indicate that the swimming pool water is safe for public bathing purposes.

9204-056. Patel M K (IDL Cheml Ltd, 91ty Contl Lab, Rourkela 769016). **Correlations among trace metals in the coastal waters of Visakhapatnam.** *Indian J Environ Prot*, **12** (4) (1992), 281-289 [7 Ref].

Possible correlations among seven trace metals of the waste waters of Visakhapatnam have been calculated in this paper by analysing recent data. For this purpose, the correlation coefficient has been calculated for each possible pair of seven trace metals, namely Mn, Fe, Ni, Cu, Zn, Cd and Pb. The implication of all the findings are discussed in detail.

9204-057. Patel S K (Sch Std Geo, Vikram Univ, Ujjain 456010). **Study of groundwater quality for irrigation in and around Ujjain city (MP).** *J Nature Conserv*, **4** (1) (1992), 1-9 [9 Ref].

Groundwater quality of the area has been analysed for irrigational use with the help of Wilcox and U.S. Salinity diagrams. Results indicate that the groundwater quality of the following regions in the study area is unsuitable for irrigational purpose: Garhkalika, Bharathari caves, southern side of Runmuktheswar and Solah sagar region, Nagar Kot Ke Rani region, Rudhra sagar and Jaisinghpura region and eastern side of Hira and Binod Mills. Groundwater samples of the above region indicate high salinity.

9204-058. Pathak S P, Kumar San.jay, Ramteke P W, Murthy R C, Singh K P, Bhattacharjee J W, RayPK (Indl Toxic Res Cent, PB No. 80, M G Marg, Lucknow 226001). **Riverine pollution in some northern and north eastern states in India.** *Environ Monit Assessment*, **22** (3) (1992), 227-236 [22 Ref].

Water samples from 30 rivers in northern and northeastern hilly states of India were analysed for bacteriological and physicochemical parameters along with metals and pesticide residues. It was found that 34% of samples had > 50 coliforms/ 100 ml. while 24% of samples demonstrated > 50 thermotolerant (faecal) coliforms/100 ml. Among the metals, iron was found to be above maximum permissible limits in the rivers of all the states, while manganese was found to be above the maximum permissible limits in the rivers of Tripura and some northern states.

9204-059. Parvez Shamsh, Pandey G S (Sch Std Chem, Ravishankar Univ, Raipur MP, 492010). **Impact of ponded effluent of thermal power plant on ground water characteristics.** *Asian Env*, **14** (2)(1992), 34-39 [11 Ref].

Important physicochemical characteristics have been determined in the ponded water of a thermal power effluent. These parameters have also been studied in the ground water samples collected up to a distance of 4 Km from the pond. The parameters have been found to be significantly increased in the area of study compared to their values in the uncontaminated area. In the case of a sampling site near a river side, the impact of the ponded water was, however, found to be smaller.

9204-060. Radhe S, Seenayya G (Microbio Dept, Osmania Univ, Hyderabad 500007). **Environmental factors affecting the bioavailability and toxicity of Cd and Zn to an anaerobic bacterium Desulfouibrio.** (*The Sci Total Env*, **125** (1992), 123-136 [30 Ref]).

Husainsagar lake receives heavy metal pollutants through a channel which passes from the industrial area. Concentrations of Cd, Cu and Zn in lake water were 4.6, 21.2 and 197.0 mg/l, respectively and were within permissible limits. However, the concentrations of Hg and Cr were 10 and 82 mg/l and have exceeded the limits. The toxic levels of Cd and Zn to the growth of Desulfovibrio, a predominant sulfate reducing anaerobic bacterium, isolated from surficial sediments of the lake, were determined. Cd (23.0 mg/ml) and Zn (9.1 mg/ml) inhibited the growth of Desulfovibrio. Environmental factors have influenced the levels of toxicity of Cd and Zn.

9204-061. Ranthan J V S, Bisht Shashi, Grover S P (Dept Zoo, DAV (PG) Coll, Dehradun 248001). **Yearly variation** in certain physicochemical parameters of pond at eastern Doon Valley. *Uttar Pradesh J Zoo*, **12** (1) (1992), 75-77 [8 Ref].

Samples of water of the pond at Doon Valley were analysed for water and atmospheric temperature, pH value, dissolved oxygen, free carbondioxide, alkalinity, phosphates, nitrates, total dissolved and total suspended solids.

9204-062. Sharma R D, Lal P, Chang ST, Harkar D B (Chambal Krishi Kendra Nanta Farm CAD, Kota). **Studies on some selected chemical properties of groundwaters used for irrigation within Chambal command area, Kota Rajasthan.** *Acta Ecologica*, **14** (1) (1992) 44-47 [6 Ref].

Fifty three water samples from different wells used for irrigation within Chambal command area were collected and analyzed for different constituents. Results show that the majority of waters are high in salinity and sodium. These waters are likely to create problems for the vertisols of Kota region.

9204-063. Shibu S, Ritakumari S D, Nair N Balakrishnan (Dept Aquatic Bio Fisheries, Univ Kerala.Thiruvananthapuram 695007). **Environmental inventory and the distribution of inorganic nutrients in a tropical estuary of the southwest coast of India.** *J Indian Fisheries Assoc*, **20** (1990). 59-67 [12 Ref] [Late Pub].

Dissolved nutrients estimated in the surface and bottom waters of five selected stations of the Evaravur lake during February 1987 to January 1988 revealed distinct seasonal variations. Rainfall and land drainage play significant roles in the nutrient economy, particularly $\text{NO}_3\text{-N}$ and $\text{SiO}_4\text{-Si}$ of this water body. Abnormally high values of $\text{PO}_4\text{-P}$ indicated extremely polluted condition at the retting zone of the lake during the premonsoon season.

9204-064. Shukla Suresh C, Tripathi B D, Mishra B P, Chaturvedi S S (Polln Eco Res Lab, Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Physicochemical and bacteriological properties of the water of river Ganga at Ghazipur.** *Comp Physio Eco*, **17** (3) (1992), 92-96 [18 Ref].

The bacteriological and physicochemical properties of the water of River Ganga were studied at four sampling sites at Ghazipur, U.P., from May 1987 to April 1988. For bacteriological analysis, samples were tested for standard plate count (SPC) and total coliform (TC) bacteria. Depletion in the dissolved oxygen, and increase in ECE, BOD, COD, pH, nitrate N, phosphate P, sodium, potassium and calcium contents of Ganga water was recorded near the area affected with sewage and industrial effluents.

9204-065. Somasekhara Rao Kaza, Venkateswara Rao L, Padmavathy D, Rambabu C (Andhra Univ, PG Cent, Dept Chem, Nuzvid 521201). **Groundwater quality in Challapalli Mandalam.** *Indian J Environ Prot*, **12** (5) (1992) 341-347 [4 Ref].

Physicochemical and bacterial parameters of 23 bore wells and dug wells of 23 villages of Challapalli Mandal were monitored. The quality of well waters was assessed by comparing with existing standards for important parameters. Correlation coefficients among various water quality parameters were determined. It was found that there is high incidence of fluoride.

9204-066. Someswara Rao N, Venkateswara Rao T N V, Jagannadha Rao D, Narashima Mitrthy B, Sastry D S (Analyt Chem Sec, Sch Chem Andhra Univ, Waltair 530003). **Impact of textile and dyeing industrial effluents on the ground water quality a case study.** *Asian Env*, **14** (2) (1992), 47-50 [19 Ref].

Studies on impact of textile and dyeing industrial effluents on the groundwater quality in and around Coimbatore have shown very high concentrations of total dissolved

solids, electric conductivity, hardness. chlorides. sulphates in the bore wells in the industrial areas as well as Siruvani reservoir waters. The nitrate contents in some wells, in close proximity of drainage canal are more than the permissible limits. Metals like zinc, lead, copper and iron are slightly higher but within permissible limits.

9204-067. Soni P, Kumar Om, Vasistha H B (Environ Res Stn, Forest Res Inst, Dehradun). **Reclaiming mined lands for management of water quality.** *Indian J Forestr*, **15** (1) (1992), 9 -16 [5 Ref].

Paper presents the reclamation approach followed in a surface mined rock phosphate mine area. Role of vegetative reclamation in managing the water quality of mined waters with special reference to pH, Ec, and sediment concentration has been discussed.

9204-068. Sukumaran G B, Sadagopan V (Dept Geo, Presidency Coll, Madras 600005). **Impact of river Cooum on the adjoining groundwater in the city of Madras, Tamil Nadu.** *Bull Env. Sci*, **8** (1990), 13-20 [8 Ref] [Late Pub].

The physicochemical parameters of the groundwater of the adjacent areas of the bank of river Cooum was made. Koyambedu Bridge, Nunganhalam bridge and New MLA Hostel were selected for experimentation and observation as station I, II, III. Results of all the stations have been mentioned and it was found that the groundwater has been highly polluted and accordingly recommendations have been suggested.

9204-069. Surpate A R, Gaykar B M (Bot Dept, Shivaji Univ, Kolhapur 416004). **Heavy metals from Kalbadevi and Are estuaries along Ratnagiri coast (Maharashtra).** *Proc Acad Environ Bio*, **1** (2) (1992), 129-139 [20 Ref].

Heavy metal pollution of two estuaries viz. Kalbadevi and Are along Ratnagiri coast is studied. High levels of heavy metals having tendency to accumulate in sediments is observed. Further, the data is correlated with other parameters of water and soil, and possible mobilization of these elements in these estuaries is studied.

9204-070. Vijay Kumar V, Lal C ST, SwamayM SR, Rao PL K M (Water Mineral Exploration Res Trng Inst, Medchal Rd, Hyderabad 500855). **Incidence of nitrates in groundwater in Medchal block of Ranga Reddy district Andhra Pradesh, India.** *Asian Env*, **14** (1) (1992), 52-63 [9 Ref].

Presence of nitrates in groundwater, and its relationship with other physicochemical constituents of waters has been studied in a grid pattern. Nitrate concentration was found to increase with decrease in pH and with increase in hardness, chloride, sulphate, total solids while alkalinity, fluoride and water table do not exhibit any significant effect on nitrate content. Statistical analysis of the data was presented.

9204-071. Wani I A, Subla B A (Dept Zoo, Govt Degree Coll, Sopore, J & K State 193201). **Physicochemical features of two shallow Himalayan lakes.** *Bull Env Sci*, **8** (1990), 33-40 [32 Ref] [Late Pub].

Paper discusses some physicochemical features of two shallow Himalayan lakes situated in the Kashmir Valley. The lakes were investigated between September 1983 to February 1985 at monthly intervals. The two lakes are well buffered with pH always towards alkaline side. Free CO₂ was not detected in the two water bodies for most of the study period.

Noise Pollution

9204-072. Pal A K, Pandey Madhukar, Mitra H (Indian Sch Mines, Cent Mining Env, Dhanbad 826004). **The effect of noise on hearing ability with respect to the workers of coal washeries.** *Indian J Environ Prot*, **12** (5) (1992), 348-351.

The existence of high noise situation inside CPP/washery complex has been observed creating potential risk to the hearing of washery workers. This paper mainly deals with the audiometric analysis of the washery workers which facilitates to have an idea of the average audibility standard of the washery workers. A comparative analysis between exposed workers and non exposed workers has also been carried out in order to reveal the magnitude of the problem.

9204-073. Singhal S P (Natl Physical Lab, New Delhi 110012). **Noise standards in India.** *Int J Toxtco Occupl Environ Hlth*, **1** (2) (1992), 19-25 [21 Ref].

In India, pollution due to noise became an offence like air and water borne emissions through the promulgation of the comprehensive Environment (Protection) Act of 1986. Noise from industries, automobiles, domestic appliances and public address system has been recognised to be a major source to which a large majority of people are exposed for long hours. Studies for ambient noise, automobile noise and some of the domestic appliances have already been notified and some other are in process. These standards have been laid down keeping in view the standards of the other countries, existing noise levels, economic feasibility, climatic conditions and social habits of the people. A history of the efforts made to bring this legislation have been described along with the standards prescribed in India vis-a-vis other countries of the world.

9204-074. Singh P K, Chowdhury A (Polln Contl Res Inst, Bharat Heavy Electricals Ltd, Ranipur, Hardwar 2494033). **Workplace noise problems in fabrication industry.** *Indian J Environ Prot*, **12** (7) (1992), 490-492.

High noise levels of the order of 80 to 100 dB exist in fabrication units due to processes involving metal to metal contact, such as fettling, grinding and descaling. This paper deals with measures to reduce the noise levels in such units. Significant noise reduction was achieved by means of surface damping of workplace and acoustic

barriers. The results of experiments carried out have been presented in this paper. Additional measures towards a better workplace environment have also been recommended.

Ecology

9204-075. Ahmed M Shafiq, Durairaj G, Suresh K, Nair K V K (Dept Zoo, Univ Madras, Madras 600025). **Effect of power plant heated effluent on distribution of sedimentary fauna and flora.** *Indian J Marine Sci*, **21** (3) (1992), 188-191 [23 Ref]

Sedentary faunal and floral assemblages at heated and nonheated areas of the discharge canal of Madras Atomic Power Station (MAPS) were observed over an annual cycle as compared with those of the intake area. Barnacles (30.57%) followed by hydroids, ascidians, green mussels, tube worms (81.2%), brown mussels (5.10%), and sea anemones (10.14%) were conspicuous in the intake area.

9204-076. Ahmed Masood, Alireja Shayestehfar (Dept Zoo, Marathwada Univ, Aurangabad 431004). **Diurnal fluctuations in population density of zooplankton from Nahsagar, Paithan (Maharashtra).** *Proc Acad Environ Bio*, **1** (2) (1992), 173-178 [10 Ref].

Present study is stretched over four diel periods during the four months of winter, from lentic water. It is an attempt to correlate the fluctuations in population density of surface zooplankton with some selected physicochemical parameters. The population density was more during November and December and high population count was at 6 and 18 diel hours.

9204-077. Banerjee S K, Nath S, Mukherjee A, Namkhata D (Forest Soil Vegetation Surv, Eastern Region, Kotabazar, PO, Dist Midnapore 721101 WB). **Ecological status of Shorea robusta in lateritic region.** *Indian J Forestry*, **15** (1) (1992), 38-43 [11 Ref].

The distribution of vegetation in Sal (*Shorea robusta*) forest of the lateritic region of Midnapore, West Bengal was studied in order to evaluate the ecological status of the area. Out of the 56 tree species detected *S. robusta* appears to be the most gregarious one. IVI values ranging from 164.50 to 200.41. The ecological success of the associated

species is very small as such little dilution of Sal forests could be recorded. The Sal forest of this region presents a unique characteristic showing combining features of "Dry" and "Moist" Sal, the former being Reflected in its quality and ground cover and the latter in its purity.

9204-078. Bhat K, Waghm A B (Natl Inst Oceanogr, Dona paula, Goa 403004). **Biochemical composition of zooplankton of Bombay High (platform) area in the Arabian Sea.** *Indian J Marine Sci*, **21** (3) (1992), 220-223 [22 Ref].

Variations in the biochemical constituents and calorific values of zooplankton from an offshore oil processing platform were estimated. Mean value of biomass was 0.35 ml m³ with relatively higher values during postmonsoon period. Copepods formed the major component (> 80%) of zooplankton throughout the year. The results revealed that the zooplankton of Bombay High area do not have extensive lipid and carbohydrate storage, suggesting that the protein, in addition to lipid may serve as a metabolic reserve.

9204-079. Bisht B S, Chattoraj A N (Dept Zoo, H N B Garhwal Univ, SRT Campus, Tehri Garhwal 249001). **Quantative and frequency distribution of collembola from different sites of Alaknanda valley of Garhwal Himalayas.** *Himalayan J Env Zoo*, **6** (1) (1992), 13-16 [7 Ref].

This investigation is a part of study to analyse the Collembolan fauna. Out of twenty seven species of collembola recorded from different ecosystems of Alaknanda valley, few were studied under the subterranean forms, while most of them were recorded as surface dwelling forms. On the other hand, members of Hypogastruridae, Entomobrydae, Sminthuridae were found on the surface layer of the soil.

9204-080. Chakraborty S K, ChoudhuryA (Dept Zoo Fisheries, Vidyasagar Univ, Midnapore, WB). **Population ecology of fiddler crabs (Uca spp) of the mangrove estuarine complex of Sundarbans, India.** *Trop Eco*, **33** (1) (1992), 77-88 [26 Ref].

Occurrence, abundance and seasonal fluctuation of population density and biomass of fiddler crabs (Uca spp) from two selected intertidal belts of Sagar Island, Sundarbans, India were studied in relation to some major ecological parameters from

March 1983 to February 1985. Salinity and sediment texture appeared to be the important factors controlling the distribution and abundance of different species.

9204-081. Goel P K, Kulkarni A Y, Khatarkar S D, Trivedy R K (Y C Coll Sci, P G Dept Polln Std, Karad 415110). **Studies on diurnal variations in some physicochemical characteristics and phytoplankton of a fresh water polluted pond.** *Indian J Environ Prot*, **12** (7) (1992), 503-508 [25 Ref].

A study on the diel variations of some limnological characteristics in a polluted pond shows that they have a distinct diurnal cycle. Temperature, pH, oxygen and carbonate increased during the day in contrast to free CO and bicarbonate which remained maximum during the night. Statistical models have been developed for these diurnal patterns based on periodic regression.

9204-082. Govindan V S, Devika R, Shanmuge Valli R (Cent Environ Std, Anna Univ, Guindy, Madras 600025). **Sublethal effect of cadmium on primary productivity in waste stabilisation pond.** *J Ecoto Environ Monit*, **2** (1) (1992), 47-52 [17 Ref].

Study deals with the sublethal concentrations of cadmium on primary productivity, respiration, carbon fixation/reduction and chlorophyll contents of algae in waste stabilisation pond. When the concentrations of cadmium applied increased from 0.1 to 0.5 mg/l, the gross productivity, net productivity and carbon 8 fixed decreased steadily and reached the maximum at 60 cm depth.

9204-083. Jayara; E G, Reddy M P M (Coll Fisheries, Univ Agril Sci, Mangalore 575002). **Benthic biomass and sediment distribution in the coastal waters off Mangalore and their possible influence on trawl fish catches of the zone.** *Env Eco*, **10** (3) (1992), 597-601 [14 Ref].

Benthic biomass in the Arabian Sea off Mangalore ranged from nil to 367.44 g/m³ during January to December, 1981. The benthic biomass was generally low at 8 m depth, increased at 16 and 30 m depths and then decreased at 40 m depth. The organic carbon (%) content in sediments varied from 1.82 to 4.48 and was found to be maximum during December. A direct relationship between the benthic biomass and trawl fish catch was observed during the study period except in February and December.

9204-084. Joseph A, Selvanayagam M, Jebanesan A (Dept Zoo, Loyola Coll, Madras 600034). **Interaction of hydrological parameters with the abundance of fish in the river Cooum, Madras.** *J Nature Conseru*, **4** (1) (1992), 45-51 [12 Ref].

The occurrence and abundance of fish has been studied along the 18 km stretch of the Cooum river in the vicinity of Madras. Nine stations were selected with reference to the source of pollution from Thirverkadu to Napierbridge (seamouth) and water samples were collected once in a month and the physicochemical parameters were estimated for a period of six months from December 1985 to May 1986.

9204-085. Joshi Anjana, RaJput Sushma (Rani Durgavati Univ, Dept P G Std Res Biol Sci. Jabalpur 482001). **Distribution of some human, pathogenic bacteria in two freshwater lakes of Jabalpur.** *Indian J Environ Ptot.* **12** (5) (1992). 321-323 17 Ref].

A systematic study on the distribution of some pathogenic bacteria in 2 fresh water lakes of Jabalpur, had been undertaken, during December 1990 to August 1991. The results indicate high degree of pollution in these lakes. The occurrence of pathogenic microorganisms, that is *Salorrsnella* sp and *Vibrfo* sp. were highest during summer season, but *Klebseilla* sp and *Shigella* sp were highest during winter season. Simple mean for detecting these organisms and their significance as pathogens may make them superior as indexes of water quality from the view point of public health.

9204-086. Kaushik S, Agarkar M S, Saksena D N (Sch Std Zoo, Jiwaji Univ, Gwalior 11, MP). **Distribution of phytoplankton in riverine waters in Chambal command area, Madhya Pradesh.** *Bionature*, **12** (1 &2), (1992), 1-7 [24 Ref].

A phytoplanktonic survey along with water quality of Saank, Asaun, Kuari and Chambal rivers in Morena district (M P) has been reported for the first time. All the rivers under study seem to be polluted. The degree of pollution determined by calculating water quality indices follow the order Saank with WQI 209.36> Chambal with WQI 186.15>Asaunwith WQI 169.84> Kuari with WQI 148.72.

9204-087. KesavaRao Ch (Cheml OceanogrDiv, Natl Inst Oceanogr, Dona Paula, Goa 4030041). **Elemental composition of Indian marine algae a biogeochemical perspective.** *Indian J Marine Sci*, **21** (3) (1992), 167-177 [127 Ref].

Data on elemental composition of 31 elements in about 120 algae from Indian coast are compiled and their concentration factors (CF) are calculated. Relatively wide spread ranges are recorded for almost all elements in algae. Seasonal data show that the concentrations of Na, K, Ca, Mg, S, F, Cl, Br, I, B, etc. were recorded higher during early growth stages, thereafter they were irregular.

9204-088. Mohanty R C, Dash R C, Mohapatra P L (Dept Bot, Utkal Univ, Bhubaneswar 751004). **Algal zonation and oscillations in high wave energy environment of the Chika Lagoon.** *J Ecotoxicol Environ Monit*, **2** (1) (1992), 53-59 [22 Ref].

Plant communities of the intertidal zone of the Chilka lagoon, connected with Bay of Bengal, are commonly exposed to high energy wave activity, coupled with biotic pressure of browsing grazers. One of the common members of this environment *Gracilaria* sp grows along with diatoms and dinoflagellates with only one peak in summer.

9204-089. Nirmal Kumar J I (PG Dept Bot, Jai Hind Coll, Dhulia, Maharashtra 424002). **Seasonal primary production of phytoplankton of temple tank Vadatal, Gujarat, India.** *J Indian Botl Soc*, **70** (1991), 427-428 [5 Ref].

Studies on monthly variations in Gross Primary Productivity (GPP) and Net Primary Productivity (NPP) at surface and subsurface levels of Temple tank at Vadatal in Gujarat, have been reported. Both GPP and NPP showed gradually increase from August onwards with a small peak in November, followed by a decrease in December and January. The great peak in primary production was noticed in June. The high rate of productivity during summer and early winter have been attributed to high nutrients, temperature, light and other factors besides phosphorous and nitrogen as decisive factors.

9204-090. Pandey B L, Singh B K, Rao P L N (Centl Inland Fisheries Res Inst, Pune 411028). **Species diversity of planktonic community as an index of pollution in fish ponds at Pune, Maharashtra.** *Proc Acad Environ Bio*, **1** (2) (1992), 167-172 [8 Ref].

Species diversity indices have been used to plankton community to identify the aquatic ecosystem. In a pond affected with pollution, species diversity "H" ranged from 0.74506 bits/units to 2.37503 bits/unit, H-max (1.99999 3.32192) and evenness "J" (0.37253 0.74924). *Melosira* sp. was abundant in the ponds amongst the planktonic organisms.

9204-091. Patnaik K C, Misra P M (Dept Marine Sci, Berhampur Univ, Berhampur 760007, Orissa). **Seasonal variation in the physicochemical properties of Rushikulya estuary and its effect on the occurrence of *Chanos fry*.** *J Indian Fisheries Assoc*, **20** (1990), 69-71 [4 Ref]. [Late Pub].

Seasonal variation in some physicochemical properties of Rushikulya estuary was studied. The surface water temperature varied from 20 to 34.5°C, the transparency of the water from 86.3 to 12 cm, the salinity from 28.3 to 32.8‰ and the pH from 6.77 to 7.35. The transparency and salinity showed bimodal distribution.

9204-092. Rao VNR, Hari Prasad V, Mohan R, Ramasubramanian R (Cent Adv Std Bot, Univ Madras, Guidy Camsus, Madras 600025). **Seasonal variations in organic production in relation to nutrients in the Ooty lake, Tamil Nadu, India.** *Asian Env*, **14** (1) (1992), 69-77 [17 Ref].

Investigations were undertaken in the Ooty lake with a view to assess its water quality with particular reference to nutrients and their influence of phytoplankton production. The study was conducted over a period of one year from November 1987 to October 1988. Results revealed that the lake is eutrophic supporting very rich algal blooms. Phytoplankton counts as well as organic production were high in the lake all through the year, coinciding with high nutrients and chlorophylla.

9204-093. Routray B K, Baliar SinghPK, MohantyB, Chaudhury R C, Padhi S (Dept Bot, Berhampur Univ, Berhampur, Orissa). **Microbial communities as indicators and monitors of sugar factor waste.** *Comp Physio Eco*, **17** (3) (1992), 117-120 [9 Ref].

Results of one year study on phyto & zooplankton communities inhabiting the sugar factory waste waters of Aska Sugar Mill, Orissa, are presented. Seasonal variation in phyto and zooplankton communities and their role as indicators of water pollution are discussed. The possibility of using such indicator species to monitor the pollution effect has been discussed.

9204-094. Sehgal Harjeet S, Kaur.Kamaldeep, Sehgal Gurpreet K (Fisheries Res Complex, Dept Zoo, Punjab Agricl Univ, Ludhiana 141004). **Zooplankton response to biogas slurry in carp ponds.** *Bioresource Techno*, **41** (2) (1992), 111-116 [24 Ref].

Biogas slurry applied at 52.1 litres ha l day (6.4% dry matter) resulted in a significant increase in total zooplankton over the control. The application of biogas slurry, however, did not change the community structure of zooplankton. Highest production of total zooplankton in biogas slurry plus supplementary feed treated tanks resulted in maximum fish yield in these tests.

9204-095. SharmaRam, Sharma K C (Dept Bot, Univ, Ajmer, Ajmer). **Diatoms of Anasagar lake of Ajmer, Rajasthan.** *Acta Ecologica*, **14** (1) (1992), 6-9 [14 Ref].

Twenty two species belonging to 15 genera of diatoms were recorded from Anasagar lake of Ajmer. Navicula affine, Nitzeschia recta and Placoneis sp were found to be resistant to polluted waters mainly due to sewage waste disposal. Seasonal variations in diatom populations may be correlated with changes in dissolved oxygen and carbondioxide levels along with other physicochemical parameters of the lake.

9204-096. Suresh K, Ahmad M Shafiq, Durairaj G (Dept Zoo, Univ Madras, Madras 600025). **Ecology of interstitial meiofauna at Kalpakkam coast, east coast of India.** *Indian J Marine Sci*, **21** (3) (1992), 217-219 [14 Ref].

Interstitial merofauna was studied for 25 months (December 1988 to December 1990). Meiofaunal populations mainly composed of harpacticoids (57%), nematodes

(24.7%), turbellids (6.7%) and polychaetes (3.3%). The observed maximum and minimum meiofaunal population densities (no. 10 cm²) were 5276 and 484 respectively.

9204-097. Venkataraman K (Zool Surv India, MBlock, New A1ipore, Calcutta 700053). **Cladocera of Keoladeo National Park, Bharatpur and its environs.** *J Bombay Natl Hist Soc*, **89** (1) (1992), 17-26 [22 Ref].

A study made on collections of zooplankton from shallow waters and ponds in and around Keoladeo National Park, Bharatpur, yielded 39 species of Cladocera, of which 25 are recorded for the first time from Rajasthan. Some selected species recorded in the present study are illustrated and described.

Nature and Natural Resources Conservation

9204-098. ChauhanSK, Sharma Pritam K, Moorti TV (Dept Agricul Economics, H P Agril Univ, Palampur 176062, HP). **Studies on wooing wastelands for environmental protection and economical biomass productivity with bamboos (Dendr calamus hamiltonic in western Himalayas some projections.** *Indian J Forestry*, **15** (2) (1992), 121-130 [5 Ref].

In a case study conducted in district Kangra of Himachal Pradesh in Western Himalayas pertaining to socioeconomic aspects and extent of wastelands. The extent of wastelands per farm was found to be inversely related to altitude exhibiting their greater interaction with human beings and animals. The dependence of people on fuel wood was quite heavy and was directly proportional to altitude. Besides the shortage of fuel wood, fodder and timber, the environmental degradation in terms of floods in monsoon, and repeated droughts in summer emanating from disrupted hydrological cycle, was also noticed around such lands. In order to bring these lands back to health in terms of producing fodder, fuelwood and timber besides restoring environmental protection, their rehabilitation with bamboos plantation has been suggested and projections have been made that following this biomass system on the wastelands, a net profit of Rs. 33.76 per ha with benefit cost of 13.75 could be attained.

9204-099. Girach R D (Surv Medicinal Plants Unit, Regl Res Inst, Unani Med, Bhadrak 756100, Orissa). **Medicinal plants used by Kondh tribe of district Phulbani (Orissa) in Eastern India.** *Ethnobotany*, **4** (1&2) (1992), 53-66 [7 Ref].

This communication is an outcome of the survey carried out among Kondhs of district Phulbani in Orissa to record plants used by them in the treatment of diseases. The present study deals with 51 folk drugs used by them in 13 diseases. The information presented here has been gathered from medicine men and other experienced informants among the Kondhs.

9204-100. Jain Ashok K (Sch Std Bot Jiwaji Univ, Gwalior 474011). **Clans of Sor tribals of Madhya Pradesh and their role in conservation.** *Ethnobotany*, **4** (1&2) (1992), 67-69 [3 Ref].

The Sor tribals inhabit mostly four districts of Madhya Pradesh. There are about 28 types of clans among these tribals, and 12 of them have been named after plants. Various taboos and totems are associated with these plants. These clans play an important role in conservation.

9204-101. Misra J, Pandey H N, Tripathi R S, Sahoo U K (Dept Bot, Sch Life Sci, N E Hill Univ, Shillong793014). **Weed population dynamics under 'jhum' (slash and burn agriculture) and terrace cultivation in northeast India.** *Agricl Ecosyst Env*, **41** (3&4) (1992), 285-295 [18 Ref].

The pattern of emergence, survival and mortality of six weed weed population were studied for 2 years in potato fields under slash and burn (Jhum) and terrace cultivation in Meghalaya, northeast India. The composition of the weed flora in 'jhum' and terrace fields was similar, however, the population density was generally higher in the former. High annual rate of increase in weed seeds in soil and low seedling recruitment rate appear to be the main causes of larger weed seed populations in 'jhum' fields compared with the terraces, The larger soils seed bank in jhum than in terrace eventually contributed to a larger weed population in the former.

9204-102. Sahasrabudhe Vinay (7, Satyashri, Shivaji Nagar, Naupada, Thane (west) 400062). **Facing the challenge of Jhum: the Arunachal experiment.** *Ecology*, **6** (1) (1992), 2-6 [3 Ref].

The paper discusses merits and demerits of existing practice of Jhum cultivation in Arunachal Pradesh. While describing the socioeconomic aspects of Jhum cultivation, various views of Government officials and environmentalists and farmers have been cited. Efforts to tackle this crisis by various Governmental agencies have been reported to lack coherence, coordination, and collective perception of the lurking dangers of this practice. A clear-cut, well conceived, time bound action programme involving concerted efforts by various Government departments, to combat Jhum is suggested.

9204-103. Sharma Anil, Kant Shashi, (Regl Res Lab, Canal Rd, Jammu Tawi). **Floristic analysis of Bhadarwah, Jammu (J&K).** *Acta Ecologica*, **14** (1) (1992), 22-26 [8 Ref].

Species and the dynamics of total Paper deals with the floristic analysis of Bhadarwah region of District Dodain J &K State along with some of the physical features of the area. In all 466 species spread over 308 genera and 89 families of monocots and dicots have been recorded. The ratio of genera to species, families to genera and families to species have been observed to be 1: 1.5, 1: 3.4, and 1: 5.2 respectively.

9204-104. Sikrawar R L S, Kaushik J P (Sch Std Bot, Jiwaji Univ, Gwalior 474011, MP). **Some less known medicinal uses of trees among the Sahariyas of Morena district, M.P., India.** *Ethnobotany*, **4** (1&2) (1992), 71-74 [119 Ref].

The Sahariya tribe inhabits southwest part of Morena district. They utilize many plants for medicinal purposes from their surrounding areas in the treatment of ailments and diseases. The present communication deals with 15 tree species used by Sahariya tribe.

9204-105. Singh K K, Maheshwari J K (Natl Botl Res Inst, Lucknow 226001). **Folkmedicinal uses of some plants among the Tharus' of Gorakhpur district, Uttar Pradesh, India.** *Ethnobotany*, **4** (1&2) (1992), 39-43 [8 Ref].

Present study deals with new or less known medicinal uses of 30 plants among the Tharus of Gorakhpur district, U.P. The information on local names, ethnomedicinal

preparation, dosage, mode of administration, locality and frequency of the species has been recorded after careful examination.

9204-106. Singh R P, Prasad Bhagwati, Bahar Nawa (Conifers Res Cent, Shimla, HP). **Cotoneaster microphylla Wall a suitable species for soil conservation in temperate regions of Himalayas.** *The Indian Forester*, **118** (9) (1992), 672-675 [3 Ref].

Cotoneaster microphylla Wall, seed has seed coat dormancy and concentrated sulphuric acid treatments proved effective in hastening germination. Roots of a single plant can bind soil upto 1.88 m² with the, strong lateral and fibrous roots. Intricately branched aerial portion of this species spreads on an average over 2.26 m³ land surface and helps in checking splash erosion.

9204-107. Sinha A R P (Dept Bot, J N Rajkeeya Mahavidyalaya, Port Blair, 744104, Andaman & Nicobar Islands). **Impacts of growing population and tourism on the endemic flora of Andaman & Nicobar Islands.** *Environ Conserv*, **19** (2) (1992), 173-174, 182 [4 Ref];

Impact of growing population and tourism on the endemic flora of Andaman and Nicobar Islands is discussed in the present paper, The statistical records on variations in population of these Islands reveal 100% increase in the last one decade and at present the Islands have a population of three lakhs. About 225 endemic species of vascular plants have been recorded from these islands. However, the present survey revealed that due to population pressure, quite large areas of forest have been destroyed, resulting into threat to indigenous biota; and loss of 115 species reported earlier. Besides scientific management of tourism, suggestions for improving the present situation are given.

Health and Toxicology

9204-I08. Adhya A K (Dept Sanitary Engng, All India Inst Hygiene Public Hlth, 110 Chittaranjan Avenue, Calcutta 700073). **Water supply and urban malaria.** *J Inst Public Hlth Engrs, India*, **1992** (1) (1992), 36-47 [9 Ref].

The various aspects of mosquito generated problems and their solutions at different stages of water supply systems have been discussed. The paper discusses that a prudent water supply system management should lay due consideration of mosquito problems, and mosquito preventive measures should form an integral component of the system. Awareness of water engineers, beneficiaries, and all concerned, intra and inter sectoral coordination, community participation would form the success in combatting mosquito/malariogenic problems.

9204-109. Aggarwal Punam, Kundu B S, Sheoram I S (Dept Microbio, Haryana Agricul Univ, Hisar 125004). **Influence of heavy metals on growth and nitrogen fixation of diazotrophs.** *Env Eco*, **10** (3) (1992), 625-627 [9 Ref].

Heavy metals Cd, Ni, Cr, Cu and Zn influenced the cell growth and activities of diazotrophs at cultural conditions. However, the type and quantity of metals determined the toxicity. Nickel, copper and zinc were more detrimental to diazotrophs (> 0.5 mM) than others.

9204-110. Ahi Janak (Dept Zoo, Dr H S Gour Vishwavidyalaya, Saugor 470003). **Necrosis induced by an organochlorine pesticide (endosulfan) in the gonads of orthopteran insect, Poeciloceris pictus (Fabr).** *Proc Acad Environ Bio*, **1** (2) (1992), 159-165 [14 Ref].

Paper reports the necrotic effects of the experimental concentration of endosulfan, when injected into adult *Poeciloceris pictus* for different time intervals viz., 4 to 16 days. In males, the spermatogonia and the spermatocytes showed pycnosis, followed by their decline in occurrence and ultimately their disintegration after 16 days of treatment. In females, vitellogenesis was arrested in most of the stages and the ooplasm showed severe vacuolization. It can be concluded that endosulfan makes the tissue hyperactive and there is a stress, which brings about cellular deformations.

9204-111. Awal M A, Malik J K (Dept Pharmaco, Punjab Agricl Univ, Ludhiana 141004). **Effects of osines and atropine on acute phosphamidon intoxication in Bubalus bubalys.** *Bull Environ Contam Toxicol*, **49** (3) (1992), 410-416 [15 Ref].

Effectiveness of diacetyl monoxime (DAM) and 2-pyridine aldoxime methochloride (2PAM) in conjunction with ATS to counteract acute toxicity and inactivation of circulating esterases induced by phosphamidon in buffalo calves have been investigated. Although antidotal therapy was instituted within 15-20 min after insecticide administration, no significant ($P > 0.05$) reactivation of phosphamid on inhibited esterases was seen in animals treated with either DAM plus ATS or 2PAM plus ATS. These results suggest that phosphamidon is one of the most hazardous OP insecticides for buffaloes.

9204-112. Bamana V S, Trivedi P N, Ranade S S, Daoo V J (Cancer Res Inst, Tata Memorial Cent, Parel, Bombay 400012). **Solar UV irradiance and some biological consequences: Bombay, India.** *Sci Total Env*, **121** (1992), 195-201 [16 Ref].

The Measurements of solar W radiation (WR) at Bombay were recorded using Eppley W radiometer for a 2year period. The UV irradiance is calculated and presented. The annual and diurnal, trends in the quantitation of WR are examined. The consequence of solar WR and its projected increase are discussed with special reference to its biological effects and results of WR on experimental animal systems vis-a-vis and epidemiological data in the Indian context.

9204-113. Banerjee B D, Saha S, Ghosh K K, Nandy P (Dept Biochem Nut, All India Inst Hygiene Public Hlth, 110, Chittaranjan Avenue, Calcutta 700073). **Effect of tricresyl phosphate on humoral and cell mediated immune responses in albino rats.** *Bull Environ Contam Toxicol*, **49** (2) (1992), 312-317 [20 Ref].

Effect of tricresyl phosphate on humoral and cell mediated immune responses in albino rats have been studied. The results reveal a suppression of humoral and cell mediated immune responses in rats exposed to subtoxic doses of TCP. This suppression was found to increase in a dose dependent pattern. Adverse effect of TCP

on immune function could place the host in a more vulnerable position against various pathogens.

9204-114. Baronia AK, Sahai Y N (Dept Zoo, Dr. H S Gaur Vishwavidyalaya, Sagar 470003). **Histopathological and haematological effects of benzene hexachloride on Rattus rattus Albino.** *J Nature Conserv*, **4** (1) (1992), 59-62 [13 Ref].

Sublethal dose of BHC (200 mg/ kg bodyweight) was administered to male albino rats by intramuscular injections every week for six weeks. Histopathological changes in liver resulted in hypertrophy of hepatic cell with pyknotic nuclei, binucleate hepatic cells, space formation and vacuolation. The haematological changes resulted in deduction of haemoglobin, RBC and WBC counts.

9204-115. Bhangalew Chandrakant, Norton S P, Gupta S K, Bhatnaga Upendra, Gupta Aparna (Dept Chem, Motilal Vigyan Adarsh Mahavidyalaya, Bhopal). **Effect of dichlorvos in the testes of albino rats: a G L C study.** *Himalayan J Env Zoo*, **6** (1) (1992), 17-19 [18 Ref].

GLC studies showed presence of dichlorvos to the extent of 6.80, 41.23, 360.89 and 935.82 ppm respectively in Glycine max linn residue on spraying 10,100,1000 and 5,000 ppm doses on the said grain for 8 days. The histological studies revealed no changes in the testes of rats at 10 and 100 ppm doses, at 1,000 ppm normal histological pattern was seen except necrosis of cells with a slightly disturbed pattern of spermatogenic cells, but at 5,000 ppm it showed disturbed histological pattern of testes with increased diameter of the lumens of seminiferous tubules and marked necrosis of germinal epithelium.

9204-116. Bhardwaj A C, lyagi Neelam (P G Dept Zoo, Sanatan Dharam Coll, Muzaffarnagar 251001). **Malathion induced morpho behavioural changes in Pantala, flavescens Fabr. (Odonata: Libellulidae).** *Uttar Pradesh J Zoo*, **12** (1) (1992), 1-4 [1 Ref].

An impact of malathion on morphobehavioural vicissitudes in *Pantala flavescens* Fabr. has been evaluated at various concentrations. The study has revealed loss of ability to fly acute dorsoventral abdominal convulsions, forward fore wings deflection, clockwise cyclic rotation of the dragon fly as significant symptoms.

9204-117. Bhatnagar M C, Bana AK, Tyagi Meenakshi (Dept Zoo, Meerut Coll, Meerut 250001). **Respiratory distress to *Clarias batrachus* (Linn.) exposed to endosulfan a histological approach.** *J Environ Bio*, **13** (3) (1992), 227-231 [12 Ref].

Exposure to sublethal (0.0031 ppm) and lethal concentration (0.037 ppm) of endosulfan, revealed severe changes in histology of gills which led to the erosion and disturbance in basement membrane, degeneration of gill lamella, space formation, vacuolization, necrosis, clumping of blood cells and development of lacunae in the secondary gill lamella.

9204-118. Bhattacharya Chhanda, Gautam R K (P G Dept Zoo, St John's Coll, Agra 282002). **Carbon monoxide and nitrogen dioxide effect kidney and liver enzymes in albino rats a histochemical study.** *Uttar Pradesh J Zoo*, **12** (1) (1992), 45-47 [5 Ref].

Histochemical studies made on liver and kidney show that carbon monoxide (CO) and nitrogen dioxide (NO₂) effect the activity of a few important enzymes like alkaline and acid phosphates, and lipase. Inhibitory reactions of these enzymes suggest damage to the plasma membrane, endoplasmic reticulum and the lysosomes of the tissues.

9204-119. Bulusu Saraswati, Chakravarty Indira (Dept Biochem Nut, All India Inst Hygiene Public Hlth, 110 Chittranjan Avenue, Calcutta 700073). **Nucleic acid and protein profile in normal and malnourished rat liver on exposure to organophosphorous group of pesticides.** *Int J Tounco Occupl Environ Hlth*, **1** (2) 1992), 46-51 [30Ref].

Paper reports the effect of subacute administration of three organophosphorus pesticides viz parathion, malathion and phosalone to rats maintained on 16%, 6% and 3% protein diets, on deoxyribonucleic acid (DNA), ribonucleic acid (RNA) and total protein contents of the liver. Results indicate increased toxicity of pesticides in protein deprived conditions, there being an indirect proportionality between the two factors.

9204-120. Chauhan OS, Gautam R K (P G Dept Zoo, St. John's Coll, Agra 282002). **Impact of CO and SO₂ on brain phosphatases in Funambulus pennanti a histochemical study.** *Himalayan J Env Zoo*, **6** (1) (1992), 65-68 [11 Ref].

Effect of CO and SO₂ on the activity of alkaline and acid phosphatases has been analysed histochemically in the brain of Funambulus pennanti. Inhibited alkaline phosphatase reaction suggests damage to plasmamembrane. Lysosomal damage is evident from depleted acid phosphatase reaction. Probably these air pollutants also change the life of enzymes.

9204-121. Cherian Suman, Gandhi Mayuri, Khopkar S M (Indian Inst Techno, Cent Environ Sci Engng, Powai, Bombay 400076). **Chemical speciation, characterisation and impact of metal pollutants on health from aerosols.** *Indian J Environ Prot*, **12** (5) (1992), 324-328 [10 Ref].

A systematic investigation on the sampling of aerosols by high volume sampler, their quantification by atomic absorption spectroscopy, characterisation of chemical species by ion chromatography and impact on health by survey has been carried out. It was observed that an array of industries, contribute to the high levels of Fe, Zn, and Al in the chloride or nitrite form occurring in the ambient air at Bombay, which could be related to respiratory nervous system connected diseases in man,

9204-122. Chidambaram N (Indian Inst Techno, Dept Cheml Engng, (BS & BT), Madras 600036). **Copper distribution potential in Perna viridis.** *Indian J Environ Prot*, **12** (5) (1992), 359-365 [36 Ref].

The baseline data on copper concentration in various tissues of mussel, Perna viridis, sampled from Ennore estuary and fish landing centre in Madras are reported. Highest level of copper is found in gill of mussel. The tissue of adductor mussel shows the lowest level of copper. Small and male mussel possess more affinity to build up copper contents from the environment.

9204-123. Das Mukul, Khanna S K (Dyes Food Adulterant Toxicol Lab, Indl Toxicol Res Cent, Mahatma Gandhi Marg, PB 80, Lucknow 226001). **A case for need to restrict maximum detectable limits of nickel residues in hydrogenated vegetable oils.** *Int J Toxicol Occup Environ Hlth*, **1** (2) (1992), 94-96 [18 Ref].

The levels of residual nickel catalyst in partially or fully hydrogenated vegetable oils are generally governed by the Good Manufacturing Practice (GMP) and as such many countries have not considered the need or desirability to lay down nickel limits in the final product. How far, different hydrogenated vegetable oil samples available in the Indian market follow the GMP to remove the catalyst, or whether the necessity to prescribe any limits exists in the absence of such regulations under the existing Prevention of Food Adulteration Act of India, is discussed.

9204-124. Dubey Ashutosh (Banaras Hindu Univ, Dept Mining Engng, Varanasi 221005). **Impact of trace element air pollution on human health.** *Indian J Environ Prot*, **12** (7) (1992), 512-514.

Paper provides degradational aspects of the environment in the mining areas in India due to rapid exploitation of mineral resources. The serious problem related with trace elements pollution with example and citations have been analysed in context with their effects on human beings and flora and fauna. India, with its advancing stage of mining explorations witnesses health hazards, for which remedial measures have been suggested.

9204-125. Durairaj S, SelvarajanVR (Dept Zoo, Univ Madras, Madras 600025). **Influence of quinalphos, an organophosphorous pesticide, on the biochemical constituents of the tissue of fish, Oreochromis mossambicus.** *J Environ Bio*, **13** (3) (1992), 181-185 [20 Ref].

The biochemical markers such as DNA, RNA and protein have been analysed to study their quinalphos toxicity in different tissues such as brain, liver, muscle and gill of fish *Oreochromis mossambicus*. The fish were exposed to LC50 concentration of quinalphos and analysed DNA, RNA and protein at the end of 24, 48, 72 and 96h. Results revealed heterogenous trend of DNA, RNA and protein. The significant alterations of the biochemical constituents in various tissues indicated the toxicity of the pesticide.

9204-126. Dutta H M, Datta Munshi J S, Roy P K, Singh N K, Richmonds C R (Dept Biol Sci, Kent State Univ, Kent, Ohio 44242, USA). **Variation in toxicity of malathion to air**

and water breathing teleosts. *Bull Environ Contam Toxicol*, **49** (2) (1992), 279-284 [17 Ref].

The purpose of the present study is to estimate the 24hr, 48hr and 96hr LC₅₀ values of Malathion to an airbreathing teleost fish *Heteropneustes fossilis* and to provide a possible explanation for the variations in the LC₉ values between air and water breathing fishes. *H. fossilis* became excited after exposure to different concentrations of malathion and their surfacing frequencies increased for a few minutes. After an hour, they settled at the bottom and gathered in a corner. The color of the body became pale after about 6 hr. One hundred percent mortality was observed in 22, 18, 16 mg/l at 24, 48 and 96 hr of exposures respectively. LC₅₀ values calculated by probit analysis were 16.275 mg/l for 24 hr, 14.526 mg/l for 48 hr and 11.798 mg/l for 96 hr of exposure.

9204-127. Encily Martins R, Sarodini R, Nagabhushanam R (Dept Zoo, Marathwada Univ, Aurangabad 431004). **Physiological responses of freshwater prawn *Caridina weberi* to the pesticide methyl parathion in relation to size and sex.** *Uttar Pradesh J Zoo*, **12** (1), 67-68 (1992) [9 Ref].

The mature male freshwater prawns, *Caridina weberi* was the most sensitive among the five size groups, viz juveniles, immature females, immature males, mature female and mature male exposed to methyl parathion. Among the same sexes of females, immature females were sensitive than the mature females, and in male sex, immature male was tolerant than mature male.

9204-128. Fatma Nahid, Khan Sikander G, Aslam Mohammed Rahman Qamar (Fibre Toxicology Div, Indl Toxicology Res Cent, PB 80, M G Marg, Lucknow 226001). **Induction of chromosomal observations in bone marrow cells of asbestotic rats.** *Environ Res*, **57** (2) (1992), 175-180 [27 Ref].

Cytogenic effects of Indian chrysotile asbestos in rat bone marrow cells after 290 days of intratracheal inoculation (5 mg dust/0.5 ml normal saline), when it develops massive pulmonary fibrosis, were investigated. The pulmonary fibrosis was confirmed by both histopathological studies and increased collagen content in the lung of the treated animals. In the asbestotic rats a significant increase in chromosomal aberrations was recorded and a decrease in mitotic index of bone marrow cells.

9204-129. Gajbhiye S N, Hirota R (Natl Inst Oceanogr, Regl Cent, Seven Bungalows, Versova Bombay 400061). **Toxicity of heavy metals to brine shrimps Artemia.** *J Indian Fisheries Assoc*, **20** (1990), 43-50 [26 Ref] [Late Pub].

Bioassay were carried out on 48 h cultured nauplii of brine shrimp Artemia by exposing them to seven trace elements. Synergistic effects of all these elements and additive effects of Cu and Zn, Cd and Pb and Ni and Fe were also investigated. Comparatively, the degree of toxicity for compound bioassays was higher than individual simple tests.

9204-130. Gaur K, Pandey Surendra D (Dept Reproductive Bio, All India Inst Medl Sci, New Delhi 110029). **Studies on the toxicity of two organophosphorous compounds on a freshwater teleost, Labeo rohita.** *Acta Ecologica*, **13** (2) (1992), 82-89 [7 Ref].

Two organophosphorus compounds Sumithion 50% E. C. (O,O-Dimethyl-O-(3 Methyl-4-nitrophenyl) phosphorothioate), and Kitazin 48% E.C. (O,O-diisopropyl S-benzyl thiophosphate) were induced to Labeo rohita to study the TLm value and acute toxicity. It was observed that both the compounds are toxic even at low concentration.

9204-131. Gautam A K (Biomechanics Fluid Lab, Cent Atmospheric Sci, Indian Inst Techno, New Delhi 110016). **Endosulfan induced difference spectra of the blood of Cirrhinus mrigala (Ham.)** *Acta Ecologica*, **14** (1) (1992), 40-43 [12 Ref].

Cirrhinus mrigala a freshwater major carp was taken as the test fish to investigate the impact of endosulfan on the physiological properties of blood. Different spectra of oxyhaemoglobin of the blood of the control fish and that exposed to endosulfan were determined. The absorption maxima were observed to be at 576 and 542 nm for both in the control and in fish exposed to endosulfan.

9204-132. Gautam A K, Gaur Alka, GaurKK (Cent Atmospheric Sci, Indian Inst Techno, Delhi 110016). **Methyl mercury induced changes in. the serum and tissue total protein of Cirrhinus mrigala (Ham.).** *Acta Ecologica*, **13** (2) (1991), 89-92 [13 Ref].

Cirrhinus mrigala, exposed to 6.538×10^4 ppb of methyl mercury (MeHg) for 48,72 and 96 h, caused considerable qualitative changes in the serum and tissue (muscle and liver) total protein and increase in hepatosomatic index. The data suggest that as the dose tested, MeHg produced non-repairable lesions in muscle and liver.

9204-133. Gayatri R, Chatterjee S (Sch Life Sci, Jawaharlal Nehru Univ, N Delhi 110067). **Effects of lindane on growth cellular slime mold Dictyostelium discoideum.** *Bull Environ, ContamToxto*, **49** (2) (1992), 285-289 [8 Ref].

Effects of lindane on growth of cellular slime mold Dictyostelium discoideum have been studied Cells treated for 20 min with lower doses of lindane (60 ppm) showed a slower growth rate as compared to control. Cells treated with higher doses of lindane (80 ppm and 100 ppm) showed an initial decline followed by a gradual increase. Cells treated with 100 ppm showed approximately 50% survival. When the cells were cultured in continuous presence of lindane even the lower doses of lindane (5 ppm, 10 ppm) were found to be lethal to the cells.

9204-134. Geetanjali D, Rita P, ReddyP P (Inst Genetics, Hosp Genetic Diseases, Osmania Univ, Begumpet, Hyderabad 500016). **In uitro effect of glutathione on mitomycin C in human lymphocytes.** *Bull Environ Contam Toxico*, **49** (3) (1992), 395-401 [14 Ref].

The mutagenic potential of mitomycinC (MMC) is evaluated in uitro human lymphocytes. The results indicate that GSH plays a protective role in process of chromosomal damage caused by MMC human lymphocyte cultures. Probably cysteine a byproduct of GHS is involved in the protection against the mutagenic action of MMC in vitro human lymphocyte cultures.

9204-135. George Jennifer, Andrade Chittaranjan, Joseph Thangam (Dept Pharmaco, St John's Medl Coll, Bangalore 560034). **Delayed effects of acute oral and chronic inhalation exposure to methylparathion on learning and memory in rats.** *Indian J Exptl Bio*, **30** (9) (1992), 819-822 [20 Ref].

Impairment of acquisition phase of the learning process was observed in rats even at 3 weeks after single oral exposure to the near lethal dose of commercial grade methylparathion (MP) followed by atropine resuscitation. Though there was a trend towards memory impairment in this group of animals, memory retention was not significantly affected. Chronic inhalational exposure to MP (one exposure/day for 3 weeks) did not significantly alter learning or memory.

9204-136. Ghatak D B, Konar S K (Fisheries Lab, Dept Zoo, Kalayani Univ, Kalyani 741235). **Chronic effects of mixture of heavy metal, pesticide, detergent and petroleum hydrocarbon in combination on plankton, benthic organisms and water quality.** *Env Eco*, **10** (3) (1992), 529-531 [56 Ref].

The nonlethal level (LC₅₀) of mixture of cadmium, DDVP, parathion and heptane in various combinations significantly reduced the zooplankton and phytoplankton population. The number of chironomid larvae per square meter was also decreased significantly. The various mixture pollutants also showed the significant change of dissolved oxygen, carbon dioxide, phosphate and hardness of exposed water.

9204-137. Ghate H V (PG Res Cent, Dept Zoo, Modern Coll, Pune 411005). **On the use of amphibian embryos and tadpoles in toxicity and teratogenicity testing of environmental contaminants.** *Biologia Indica*, **1** (2) (1990), 1-7 [59 Ref]

Findings of various scientific studies on toxicity and teratogenicity testing of environmental contaminants viz. herbicides, fungicides, pesticides and organic as well as inorganic chemicals including heavy metals using amphibian embryos have been reviewed. All the studies reveal that embryolarval assay system is a valuable and sensitive method to study effects of a variety of environmental contaminants.

9204-138. Ghosh A R, Chakrabarti P (Zoo Dept, Burdwan Univ, Burdwan 713104, W.B.). **Scanning electron microscopic probe into the cellular injury in the alimentary canal of *Notopterus notopterus* (Pallas) after cadmium intoxication.** *Ecotoxicol Environ Safety*, **23** (2) (1992), 147-160 [17 Ref].

Microanatomical changes attributable to cadmium poisoning have been observed in the various regions of the alimentary tract of *Notopterus notopterus* after exposure to sublethal concentrations (75.54 mg CdCl₂ litre) of the metal. After cadmium exposure

accelerated mucous cell activity in the intestine was distinct no conspicuous changes were observed in the rectal portion after cadmium exposure, except for the disintegration of columnar epithelial cells and a concomitant release of large amounts of mucus into the lumen. All these findings suggest impaired digestion and absorption through the alimentary tract of the fish.

9204-139. Ghosh R, Shrotri RV (Dept Zoo, Inst Sci, 15, M Cama Rd, Bombay 400032). **Blood glucose and tissue glycogen interrelationship in *Scyllaserrata* (Forsk.) chronically exposed to thiodan.** *J Environ Bio*, **13** (3) (1992), 233-237 [Ref].

Glycogen content was significantly reduced in hepatopancreas and muscles of crab *Scylla serrata* chronically exposed to sublethal concentrations of the organochlorine insecticide, thiodan (endosulfan) with a concurrent increase in blood glucose concentration. Analysis of the data suggests that blood glucose and hepatic glycogen profiles can be used as indicators of pollutional stress.

9204-140. Gill Tejindra S, Tewari Hema, Pande Jaishree (Dept Anat, Thomas Jefferson Univ, Philadelphia, Pennsylvania 19107). **Short and long term effects of copper on the rosy barb (*Puntius conchonius* Ham.).** *Ecotoxicol Environ Safety*, **23** (3) (1992), 294-306 [36 Ref].

The rosybarb (*Puntius conchonius*) was exposed to copper (Cu) for short (48 hr) and long (8 weeks) terms and effects on enzyme activities and biochemical variables in the blood and tissues were examined. Effects on the tissues included glycogenolysis (liver and skeletal muscles), glycogenesis (brain and heart), a marked rise in hepatic proteins accumulation of FFAs in liver and skeletal muscles, and reduction in hepatic and gonadal cholesterol contents.

9204-141. Gopaldaswamy U V, Nair C K K (Rad Bio Biochem Div, Bhabha Atom Res Cent, Trombay, Bombay 400085). **DNA binding and mutagenicity of lindane and its metabolites.** *Bull Environ Contam Toxicol*, **49** (2) (1992), 300-305 [22 Ref].

The genotoxic potential of lindane and its metabolites HCB and PCP was investigated by determining the capacity of these compounds to bind DNA in vitro and in vivo. The present studies have provided evidence that lindane and its metabolites bind co-valently to DNA and possess the characteristics of a genotoxic agent. The

metabolism of lindane in mammals involves the formation of olefinols and a subsequent epoxidation. The toxicity of halogenated hydrocarbons could arise from irreversible binding of the epoxide intermediates to cellular constituents such as DNA or membranes.

9204-142. Gotmare Sulekha R, Gaikwad S A, Mayadas M S (Dept Chem, Ramnarain Ruia Coll, Matunga, Bombay 400019). **Studies on short-term toxicity and various biological activities of copper complexes derived from 4-hydroxysalicylaldehyde Schiff bases on Tilapia.** *J Environ Bio*, **13** (3) (1992), 211-214 [7 Ref].

Short term toxicity studies were conducted with the copper complexes of various Schiff bases derived from 4-hydroxysalicylaldehyde on *Tilapia mossambica* (Peters). Reagents were also investigated for the irantibacterial, antifungal and anticoagulant activities. Copper complexes with higher log K values were observed to be less toxic.

9204-143. Gupta Manisha, Devi Santha (Electron Microscopy Sec, Natl Botl Res Inst, Lucknow 226001). **Cadmium sensitivity inducing structural responses in *Alvinia molesta* Mitchell.** *Bull Environ Contam Toxicol*, **49** (3) (1992), 436-443 [12 Ref].

Effect of Cd on the morphology and growth characteristics of *Salvinia molesta* was studied. Results revealed that sublethal concentrations of Cd produced significant morphological changes in *Salvinia*. Although epidermal damage was observed in this study, the hairs on the upper surface were not affected. An overall effect on the elasticity of the epidermis was noted. The plasma membrane, which acts as a regulatory barrier for the transport of vital molecules, and, in turn, influences the overall function of the cell constituents, appears to be the earliest target of phytotoxicity of Cd.

9204-144. Gupta Manisha, Devi Santha, Singh Jaswant (Natl Botl Res Inst, Lucknow 226001). **Effects of long term low dose exposure to cadmium during the entire life cycle of *Ceratopteris thalictroides*, a water fern.** *Arch Environ Contam Toxicol*, **23** (2) (1992), 184-189 [28 Ref].

The effects of chronic low dose exposure of the aquatic fern *Ceratopteris thalictroides* in culture to cadmium during different stages of the entire life cycle were studied. Dose dependent toxicity manifestations, including ultrastructural

pathomorphological changes were detected in all stages, with gametophytes being the most sensitive.

9204-145. Husain Raghieb, Malaviya Madhu, Seth Prahlad K, Husain Raushan (Indl Toxicol Res Cent, PB No. 80, Mahatma Gandhi Marg, Lucknow 226001). **Differential responses of regional brain polyamines following in utero exposure to synthetic pyrethroid insecticides: a preliminary report.** *Bull Environ Contam Toxicol*, **49** (3) (1992), 402-409 [17 Ref].

The in utero effects of three typical pyrethroids viz. fenvalerate (FV), cypermethrin (CYP) and deltamethrin (Dt) on the early brain development have been investigated. No gross abnormality was noted in any of the treatment groups, however at higher doses i.e. 20, 30 and 15 mg/kg of Fv Cyp and Dt respectively, cannibalism was observed in a few dams in each treatment group accompanied with foetal resorptions, loss in maternal and pup body weight. Dt exposed dams also showed vaginal bleeding, foetal and maternal death five days post treatment.

9204-146. Husain A Jhal, Singh G (Dept Chem, Univ Delhi, Delhi 110007). **Pomegranate tannin as corrosion inhibitor for mild steel in acidic medium.** *Chem Environ Res*, **1** (1) (1992), 23-28 [8 Ref].

The inhibitive action of pomegranate tannins in the concentration range of 5 to 35% (v/v) on the corrosion of mild steel in 1N sulphuric acid at different temperatures has been investigated. The inhibition efficiency increases with the increase in additive concentration and reaches maximum at the concentration of 30%.

9204-147. Iqbal Shaheena, Saxena Murli Mohan, Sethi N, Singh R K (Dept Zoo, Univ Lucknow, Lucknow 226007). **Effect of urea exposure on the hematological parameters of *Clarias batrachus*.** *Ecotoxicol Environ Safety*, **24** (2) (1992), 164-166 [15 Ref].

Hematological parameters, viz. hemoglobin content, erythrocyte count, and hematocrit values, of the freshwater fish *Clarias batrachus* upon its exposure to 50 and 100 ppm urea in aquatic medium decreased by 7.93 and 16.22, 20.96 and 29.12% and 11.11 and 36.65%, respectively, below controls, while the total leucocyte count increased by 29.26 and 52.63% respectively, above controls.

9204-148. Jagannatha Rao K S (Dept Nut Fd Safety, Centl Fd Technol Res Inst, Mysore 570013). **Aluminium complex with bio-components.** *Proc Acad Environ Bio*, **1** (2) (1992), 105-111 [6 Ref].

Al^{3+} significantly altered the two PK values (NH_3 , PO_3) of ATP, ADP, AMP'3 and AMP'5. In the case of amino acids, Al^{3+} altered the three pK values COOH, NH_3 , Rgroup (ionizable) of amino acids which has ionizable R group. Proton NMR. study indicated that Al^{3+} preferentially binds to H8 site of adenine series and W studies indicated preferential binding of Al^{3+} with ATP, AMP and ADP.

9204-149. Jayaraj Y M, Aparanji B, Nimbargi Prabhakar M (Water Polln Res Lab, Dept Std Microbio, Gulbarga Univ, Gulbarga 585106). **Amelioration of heavy metal toxicity on primary productivity of aquatic ecosystems by calcium, magnesium and iron.** *Env Eco*, **10** (3) (1992), 667-674 [33 Ref].

The influence of three heavy metals (copper, cadmium and nickel) and three common metals (calcium, magnesium and iron) on the productivity of two aquatic bodies, the Sharanabasaveshwara tank and a wastewater stabilization pond was evaluated. Heavy metal toxicity was observed to be in the order of $Cu > Cd > Ni$. Calcium and magnesium upto 100mg/liter promoted while further additions decreased the primary productivity. The study indicates that the toxicity of heavy metals to primary productivity maybe reduced in hard waters.

9204-150. Jayra, YM, Mandakini M, Nimbargi Prabhakar M (Water Polln Res Lab, Dept Std Microbio, Gulbarga Univ, Gulbarga 585106). **Effect of mercury and lead on primary productivity of two water bodies.** *Env Eco*, **10** (3) (1992), 653-658 [25 Ref].

Toxicity of three heavy metal salts, mercuric chloride, lead nitrate and lead acetate, on the productivity of two waterbodies (the Sharanabasaveshwara Tank and a domestic wastewater stabilization pond) was observed 'to be in the order of $HgCl_2 > Pb(NO_3)_2 > Pb(CH_2COO_2)$. In general, the productivity of the tank waters was more affected than that of the stabilization pond waters.

9204-151. Kakkar Poonam, Awasthi Sita, Viswanathan P N (Ecotoxic Res Cent, PB 80, M G Marg, Lucknow 226001). **Oxidative changes in brain of aniline exposed rats.** *Arch Environ Contam Toxicol*, **23** (3) (1992), 307-309 [30 Ref].

Oxidative stress in rat cerebellum, cortex and brain stem after a shortterm highdose exposure to aniline vapors under conditions akin to those after major chemical accidents, was studied. Significant increases in superoxide dismutase isozyme activities and formation of thiobarbituric acid reactive material along with depletion of ascorbic acid and non-protein sulfhydryl content suggest impairment of antioxidant defenses 24 h after single exposure to 15,302 ppm aniline vapors for 10 min.

9204-152. Kalia Kiran, Bhatt Bharati. Patel Kadamb (Dept Biosci, Sardar Patel Univ, Vallabh Vidyanagar388120, Gujarat). **Effect of manganese and copper interaction on lipid peroxide potential in brain and liver of protein deprived rats.** *Biologia Indica*, **1** (2) (1990), 49-59 [15 Ref] (Late Recd).

Present work describes the interactive effect of manganese (Mn) and copper (Cu) on lipidperoxidation of brain and liver homogenate of rats fed with low protein diet and normal protein diet. Total protein content of both brain and liver were not affected after feeding low protein diet, whereas a decrease in lipid peroxidation potential was observed in liver only. Mn and Cu alone produced a decrease in lipid peroxide formation in brain and an increase in liver, whereas the combination of the two metals showed a tendency towards antagonism in normal protein dietary group in both brain and liver.

9204-153. Kanwar K C, Tikoo Antali (Dept Biophys, Panjab Univ, Chandigarh 160014). **Hematological lesions in rat following heavy alcohol ingestion.** *J Environ Pathology, Toxicol Oncology*, **11** (4) (1992), 241-245, [29 Ref].

Hematological fluctuations following large alcohol oral administration (2 mL per animal per day) in rats were monitored at intervals ranging from 10 to 22 weeks and the findings were compared to those in control animals that were fed sucrose isocalorically. Following alcohol ingestion, there was a significant decrease in the total blood cellularity at all treatment intervals.

9204-154. Kanwar K C, Verma Anil(DeptBiophys, Panjab Univ, of Chandigarh 160014). **Alternations in the haematological profile in rat following whole body gamma radiation with and without venoruton pretreatment.** *J Environ Pathology Toxicology Oncology*, **11** (4) (1992), 235-239 [34 Ref].

The radioprotective effect of venoruton (0(5hydroxyethyl)rutoside] has been assessed in the hematological profile of Swiss albino male rats subjected to a single dose of 300 rads whole body gamma radiation. The results showed that the severity of the radiation induced abnormalities in the red and white blood cells is significantly lessened by venoruton administered prior to radiation exposure.

9204-155. Kaw J L, Waseem M (Indl Toxic Res Cent, Lucknow 226001). **Some advances in dust related pulmonary toxicology during the last decade.** *J Scent Indl Res*, **51** (10) (1992), 791-801 [191 Ref].

An analysis of the mechanism of cytotoxicity has been discussed which reveals that dustcell interaction results in the secretion from cells of a number of materials responsible for tissue injury, the significance of alterations in different components of immune system and immuno regulatory mechanisms in the pathogenesis of dust induced toxicity has been outlined. An evaluation of the studies demonstrating an association between increased incidence of lung cancer and exposure to mineral dusts has been made.

9204-156. Khan G, Mahmood N, Arif J M, Rahman Q (Fibre Toxicity Sec, Indl Toxic Res Cent, PB No 80, M G Marg, Lucknow 226001). **Asbestos and lung diseases: a mechanistic approach.** *J Scient Indl Res*, **51** (7) (1992), 507-514 [93 Ref].

The, various characteristics of asbestos, like high tensile strength, resistance to heat and chemical and its lower cost in comparison with manmade mineral fibre have given it a commercial value throughout the world. Prolonged inhalation of asbestos induced inflammatory disorders and fibrosis in the lung on the one hand and on the other is known to be responsible for the two types of malignancies, i.e. mesothelioma and bronchogenic carcinoma. The fibrogenic and carcinogenic potential of asbestos is still a major problem. The new concept is that the surface of various kinds of asbestosis

occupied by reducing sites, capable of producing superoxide anion radicals and other oxidant radicals that are inter convertible.

9204-157. Khangarot B S (Fish Immunotoxicity Proj, Indl Toxicol Res Cent PB 80, MG Marg, Lucknow 226001). **Copper induced hepatic ultrastructural alterations in the snake headed fish *Channa punctatus*.** *Ecotoxicol Environ Safe*, **23**(3)(1992), 282-293 [40 Ref].

Ultrastructural alterations in the liver of the snakeheaded fish (*Channa punctatus*) following short-term exposure to 0.05 and 0.1 mg/liter of Cu were investigated by means of transmission electron microscopy. The changes consisted of extensive proliferation of the smooth endoplasmic reticulum and dilation of the rough endoplasmic reticulum, suggesting an active detoxification attempt by the liver. Mitochondrial degenerative changes such as loss of normal material density, cristae, or outer or inner membranes with mitochondrial swelling were also observed after Cu intoxication,

9204-158. Khangarot B S, Tripathi D M (Fish Immunotoxicity Proj, Indl Toxicol Res Cent, PB 80, Mahatma Gandhi Marg, Lucknow 226001). **The stereoscan observations of the skin of catfish, *Saccobranchius fossilis*, following chromium exposure.** *J Environ Sci Hlth*, **A27** (4) (1992), 1141-1148 [17 Ref].

The surface morphology of the skin of air breathing catfish, *Saccobranchius fossilis* (Bloch) was examined with a scanning electron microscope (SEM) in both fish exposed for seven days to 5.6 mg/l chromium in water and unexposed fish. An SEM study of the Cr-exposed epidermis revealed an increased number of active mucous cells having a dilated flask or cylindrical shape; they had lost their hexa or polygonal shape.

9204-159. Krishna Murthy V, Rama Rao B S Sridhara (Regl Occupl Hlth Cent (South), India Coun Medl Res, Centl Lib Block, B M C Campus, Bangalore 560002). **Blood lead concentration of traffic personnel in city of Bangalore, India.** *Asian Env*, **14** (2) (1992), 31-38 [7 Ref].

A study was carried out in Bangalore city with a view to find out the risk associated with contamination due to pollutants from automobile exhausts in subjects exposed to the same. Environmental monitoring including biological monitoring was

carried out. The results indicate that in zones with heavy traffic the air lead levels were higher and in personnel working at the zones, the blood lead levels were higher. The air leadblood lead slope calculated from the present findings were similar to the ones reported from western countries.

9204-160. Kumari Munni, Yadav Suresh Chandra (Dept Zoo, West Patna Coll, Raza Bazar, Bailey Rd, Patna, Bihar). **DDT induced polycythaemia in an Indian catfish *Clarias batrachus* (Linn.)** *Himalayan J Env Zoo*, **6** (1) (1992), 20-23 [10 Ref].

Paper presents the impact of LC₅₀ 48h concentration of DDT on the haematology of test fish, *Clarias batrachus*. The study reveals that DDT induced polycythaemia marked by an increase in the TEC and its associated parameters like Hb content and PCV.

9204-161. Lomte V S, Sontakke Y B (Dept Environ Sci, Marathwada Univ, Aurangabad 431004). **Effect of mercuric chloride on protein content of *Thiara lineata*.** *Env Eco*, **10** (3) (1992), 734-735 [8 Ref].

Freshwater snails *Thiara luleata* collected from the river Godavari at Paithan near Aurangabad were exposed to mercuric chloride (2ppm) at acute condition. Protein content was estimated. Changes in the protein content were found in different tissues of the treated snails. During 24hour exposure foot, mantle and digestive gland showed an increase in protein content. During 48, 72 and 96hour exposures, considerable decrease in protein was observed in foot while an increase in protein was shown in mantle and digestive gland.

9204-162. Malik Ashok Kumar, Rao A L J (Dept Chem, Punjabi Univ, Patiala 147002). **A rapid spectrophotometric method for the determination of ferbam residues in grains.** *Asian Env*, **14** (1) (1992), 64-68 [19 Ref].

Ferbam has been determined spectrophotometrically after dissolving its selenium dimethyldithiocarbamate complex in acetone water mixture. The maximum absorbance is at 430 nm. The method is sensitive, selective and can be safely employed for the determination of ferbam in commercial samples and in the presence of nabam, zineb and maneb.

9204-163. Manoharan M (Sch Energy Env Natural Resources, Madurai Kamaraj Univ, Madurai 625021). **Metals in muscle tissue of some commercially important fish of Port Novo.** *J Nature Conserv*, **4** (1) (1992), 77-81 [22 Ref].

Concentration of iron, zinc, copper, manganese, sodium and potassium in edible muscle tissue of some commercially important fish of Port Novo ranged from 60.6 to 78.4 ppm of iron, 15.95 to 26.66 ppm of zinc, 1.45 to 5.01 ppm of copper, 94.65 to 617.12 ppm of manganese, 626.62 to 1769.12 ppm of sodium and 3202.01 to 4805.49 ppm of potassium.

9204-164. Maulik Gautam, Ghosh Nilanjana, Chattopadhyay Dipannita, Sengupta Tapas, Chakraborty Amiya Kumar, Chatterjee Gora Chand (Dept Biochem, Univ Coll Sci, 35, Ballygunge Circular Road, Calcutta 700019). **Protective effect of methionine on lanthanum chloride induced alterations of the antioxidant defence system of chick hepatic nuclear fractions.** *Int J Toxicol Occup Environ Health* **1**(2)(1992), 69-72 [29 Ref].

Acute single dose (i.p.) administration of lanthanum chloride (250 mg/kg body wt) to chicks has been found to affect adversely the normal operation of the antioxidant defence system of chick hepatic nuclear fractions. Such changes involved alteration in glutathione and total thiol status, lipid peroxidation and scavenging enzymes like glutathione peroxidase, glutathione-S-transferase, catalase. Amelioration of lanthanum toxicity condition by methionine supplementation may be due to the methionine serving as a precursor of glutathione.

9204-165. Memon K K G (Natl Dairy Dev Bd, PB No. 9074, Goregaon (E), Western Express Highway, Bombay 400063). **Facts and factoids in pesticide toxicology.** *Int J Toxicol Occup Environ Health*, **1** (2) (1992), 14.

Various aspects of pesticide toxicology have been discussed in the present paper. It has been suggested to judge validity of toxicity testing on various grounds, viz. tests performed according to internationally agreed methods on acute/subacute/chronic/special areas such as reproductive toxicity, mutagenicity, carcinogenic potential, etc. apart from tests on toxicokinetics, before certification of pesticides and chemicals.

Besides this judicious risk assessment would require data on exposure and hazard/benefit ratios. While discussing application of chlorinated hydrocarbons, use of appropriate pheromones as well as preparation of Pesticide Fact Hand Book is suggested.

9204-166. Mishra M, Dubey PS (Sch Std Bot, Vikram Univ, U1jain 456010). **Herbicide toxicity with antidote bioassay with soil respiration.** *Proc Acad EnvironBio*, **1** (2) (1992), 113-119 [11 Ref].

Efforts has been made to assess the effectiveness of seed treatment antidote N.A. (1, 3 Napthalic anhydride) as a soil acting antidote, through soil respiration study of two soils common of Malwa area separately and in conjunction with frequently used herbicide 2,4D (2,4-Dichlorophenovyacetic acid) and Atrazine (2-Chloro-4-ethylamino) 6 (isopropolyamino Striazine). Statistically analysed results appeared with significant increase in CO₂ output which was higher in Kshipra alluvial soil than black cotton soil in all treatments.

9204-167. Mohan Kumar R, Chandrasekhar R, Rani M V U (Dept Environ Sci, Bharathiar Univ, Coimbatore 641046). **Chromosomal aberrations and sister chromatid exchange frequencies in workers occupationally exposed to textile dyes.** *Human Exptl Toxic*, **11** (4) (1992), 275-277 [12 Ref].

The peripheral lymphocytes of 11 male and seven female workers occupationally exposed to textile dyes were studied for cytogenetic change. A significant increase in the frequency of chromosomal aberrations and sister chromatid exchanges were recorded regardless of the duration of the workers exposure to the dyes.

9204-168. Mohan Lata, Ghosh S N, Gadgil K, Sarkar M K (Natl Coun Cement Building Materials, M10, NDSEII, New Delhi 110049). **Wet capturing of fine MgO particles.** *Indian J Environ Prot*, **12** (6) (1992), 451-456 [6 Ref].

The results of some laboratory studies in the capture of fine MgO particles by trichloroethylene vapour, isobutanol vapour and steam are repeated in this paper. Photosedimentation coupled with ultracentrifugation, and scanning electron microscopy have been used to characterize the samples. Particle size distributions have been

evaluated. The extent of capture of MgO particle in different size ranges has also been examined.

9204-169. Mohapatra P K, Mohanty R C (Environ Bio Lab, Dept Bot, Utkal Univ, Bhubaneswar 751004). **Growth pattern changes of *Chlorella vulgaris* and *Anabaena doliolum* due to toxicity of dimethoate and endosulfan.** *Bull Environ Contam Toxicol*, **49** (4) (1992), 576-581 [12 Ref].

Present paper describes the effects of two pesticides, viz., dimethoate and endosulfan on the growth patterns of *Chlorella vulgaris* and *Anabaena doliolum*. Endosulfan was found to be more effective in reducing the survivability of both the test organisms than dimethoate and this finding supports the view that organochlorines are more effective than organophosphates.

9204-170. Mukherjee A, Agarwal K, Chakrabarti J (Dept Adv Std Cell Chromosome Res, Univ Calcutta, 35 Ballygunge Circular Rd, Calcutta 700019). **Genotoxicity studies of the food additive ester gum.** *Fd Cheml Toxicol*, **30** (7) (1992), 627-630 [17 Ref].

Concentrations of 50, 100 and 150 mg/kg body weight were administered orally to male swiss albino mice and sister chromatid exchange and chromosomal aberration were used as the cytogenetic endpoints to determine the genotoxic and clastogenic potential of the food additive. Although EG was weakly clastogenic and could induce a marginal increase in sister chromatid exchange frequencies, it was not a potential health hazard at the doses tested.

9204-171. Nair Amit, Pillai M K K (Dept Zoo, Univ Delhi, Delhi 110007). **Trends in ambient levels of DDT and HCH residues in humans and the environment of Delhi, India.** *Sci Total Env*, **121** (1992) 145-157 [21 Ref].

Monitoring of DDT and HCH residues in abiotic and biotic components of the environment of Delhi during 1988 to 1989 revealed low to moderate levels of these insecticides in soil, earth worms, birds, buffalo milk, water, freshwater clams, fish, human fat, human blood and breast milk samples. Total HCH residues were less than those of DDT in all the samples. This survey indicates a general decline in the levels of DDT residues in most of the samples studied when compared to previous surveys.

9204-172. Natarajan K R (Dept Biochem, PSG Coll Arts Sci, Coimbatore 641014). **Chemical inactivation of aflatoxins in peanut protein ingredients.** *J Environ Pathology Toxicol Oncology*, **11** (4) (1992), 217-227 [140 Ref].

Several chemical reagents have been investigated for their efficacy in destroying aflatoxins present in raw peanuts and defatted peanut meal. Processing conditions for inactivating aflatoxins using these chemicals were investigated. The chemical treatments had little effect on the physicochemical properties of the detoxified protein product. The advantages and disadvantages of using these chemicals for inactivation of aflatoxins are discussed.

9204-173. Nelson D Jone, Indira Rani G (PG Dept Zoo, St John's Coll, Palayamkottai 627002). **Effect of parathion on gills of field crab *Paratelphusa hydrodromus*.** *Ecotoxicol Environ Monit*, **2** (1) (1992), 19-22 [8 Ref].

Present study deals with the toxic effect of parathion on the histology of gills of the field crab *Paratelphusa hydrodromus* (Herbst.). The crabs were exposed to 0.002 ppm of parathion over a 30 day period. Fusion of adjacent lamellae, release of haemocytes from necrosed lamellae, complete loss of cuticular lining and degeneration of epithelial cell were observed.

9204-174. Patil P S, Chaudhary M V, Gadkari M P, Kulkarni K M (Environ Physio Lab, P G Dept Zoo, Govt Vidarbha Mahavidyalaya, Amravati 444604). **Effect of HCH on the lipid profiles of the fish.** *Env Eco*, **10** (3) (1992), 559-563 [13 Ref].

The fish *Rasbora daniconius* exposed to the HCH showed elevation in total lipid, phospholipid and free fatty acid contents. Total lipid content increased in early hours, upto 24 hours in liver and 12 hours in muscle and gill, and thereafter decreased with exposure period.

9204-175. Patil P S, Chaudhary M V, Gadkari M P, Kulkarni K M (Environ Physio Lab, P G Dept Zoo, Govt Vidarbha Mahavidyalaya, Amravati, 444604). **Toxic effects of HCH on glycogen content of the fish *Rasbora daniconius* (Ham.).** *Env Eco*, **10** (3) (1992), 576-578 [11 Ref].

HCH toxic effect was observed in different tissues of the fish *Rasbora daniconius*. The glycogen content of all tested tissues was depleted throughout the experimental period, decrease was highest in liver as compared to muscle and gill.

9204-176. Prakash Ram (Dept Bio Sci, Fac Nat Sci, Jamia Millia Islamia Centl Univ, New Delhi 110025). **Role of penicillamine reversing manganese toxicity in rat.** *J Nature Conserv*, **4** (1) (1992), 63-69 [25 Ref].

Study has been made to therapeutic means of the penicillamine against manganese toxicity in liver and kidney of rat. The biochemical estimations were made on the total lipids, proteins, carbohydrates and glycogen. Reversal of the values towards normal state is a sign of the favourable action of penicillamine. The mechanisms of the manganese toxicity and its retention from these tissues has also been discussed.

9204-177. Radhaiah V, Jayantha Rao K (Dept Zoo, S V Univ, Tirupati 517502). **Fenvalerate toxicity to the liver in a freshwater teleost, *Tilapia mossambica* (Peters).** *Comp Physio Eco*, **17** (2) (1992), 48-53 [20Ref].

Tilapia mossambica exposed to sublethal concentration (0.009mg/l) of fenvalerate for 10 and 20 days showed remarkable changes in the levels of carbohydrates, proteins and amino acids in the liver. A significant reduction in the specific activity levels of succinate dehydrogenase (SDH) and malate dehydrogenase (MDH), and elevation in the activity level of lactate dehydrogenase (LDH) in the liver of the fish was observed during fenvalerate stress.

9204-178. Ramalingam K, Abdul Rahman A, Meera Bai R (Sch Toxicol, Dept Zoo, Govt Arts Coll, Nandanam, Madras 600003). **Biocides and carbohydrate metabolism in *Sarotherodon mossambicus*.** *J Ecotoxicol Environ Monit*, **2** (1) (1992), 13-18 [18 Ref].

The median lethal tolerance limit for 96 h (LC_{50}) of five different toxicants was determined by renewal static bioassay for the euryhaline teleost *Sarotherodon mossambicus*. The movement pattern of the fishes following intoxication reflect the internal changes. The blood level carbohydrates and rate of oxygen uptake of fishes to sublethal concentrations revealed the toxic stress.

9204-179. Ramesh M, ManavalaramanuJam Sivakumari K (Unit Polin Bio, Dept Zoo, Bbarathiar Univ, Coimbatore 641046.) **Effect of water hardness and the toxicity of malathion on haematological parameters of the freshwater fish *Cyprinus carpio*.** *J Ecotoxicol Environ Monit*, **2** (1) (1992), 31-34 [10 Ref].

Exposure of the carp, *Cyprinus carpio* to LC₅₀ (24 b) concentration of malathion and water hardness (magnesium carbonate) on the toxicity of malathion revealed a decrease in the haemoglobin content and RBC count. Leucocyte count of exposed fish were higher than that of the control one.

9204-180. Rao N Mohan, Rathod RA, Chattopadhyay P, Parikh D J, Kulkarni P K, Kashyap S K, Chatterjee B B (Natl Inst Occupl Hlth, Meghani Nagar, Ahmedabad380016, Gujarat). **Pulmonary function tests workers in a glass factory.** *Indian J Indl Med*, **38** (2) (1992), 77-79 [8 Ref].

Pulmonary function tests were performed on 91 batch house workers exposed to silica dust, 36 workers exposed to heat in furnace operations and 150 workers not exposed to either dust or heat (controls) in a glass factory in order to measure the prevalence of ventilatory impairment in them. Significantly reduced values is FEF_{25-75%} irrespective of smoking was observed in the batch house and furnace workers indicating that it was an early affected parameter.

9204-181. Rao K R, Patil P N, Chaudhari T R, Sasana S R, Vedpathak A N (Dept Zoo, PG Sec, SSVP's LK Dr PR Ghogrey Sci Coll, Dhule 424005, MS). **Impact of cythion malathion and endosulfan on the rate of respiration on the gastropod, *Thiaralineata* from Panzara river, Dhule.** *Biologia Indica*, **1** (2) (1990), 55-57 [7 Ref] [Late Recd].

The commonly used cythionmalathion (an organophosphate) and endosulfan (an organochlorine) pesticides are selected for the present study. Acute toxicity studies (upto 96 h static bioassay) using these pesticides were carried out on the gastropods, *Thiara lineata*. Regression equations were established by using probit values and log of concentration from which LC₁₀ and LC₅₀ concentration values were calculated.

9204-182. Rastogi Subodh Kumar, Gupta Brahma Nand, Hussain Tanveer, Mathur Neeraj, Pangtey Balram Singh (Epidemiology Div, Indl Toxicology Res Cent, PB No.80, Lucknow 226001). **Cross sectional study of respiratory diseases in welders engaged in brassware industries.** *Int J Toxicol Occup Environ Health*, **1** (2) (1992), 81-87 [40 Ref].

Fiftyseven male welders (32 nonsmokers and 25 smokers) engaged in the welding of the joint faces of brassware industries were surveyed in a cross sectional study to assess the prevalence of respiratory diseases. The findings were compared with those obtained in a group of unexposed controls (N=131). The results indicates significantly higher prevalence of upper (17.5%) and lower (43.8%) respiratory diseases in the welders in comparison to that observed in the reference group. Certain diseases such as occupational asthma, tracheitis, pneumonitis were absent among the controls while the prevalence of chronic bronchitis and pulmonary tuberculosis were found to be similar in both the welders and the controls.

9204-183. Ravi G, Selvarajan V R (Dept Zoo, Guindy Campus, Univ Madras, Madras 251). **Effect of phosalone on biogenic amines in the central nervous system of the fish *Cyprinus carpio communis* Linn).** *Comp Physiol Eco*, **17** (3) (1992), 83-87 [9 Ref].

Phosalone has induced significant increase in the context of biogenic amines and in the activity of monoamine oxidase has been related to disruption in the normal synthesis of biogenic amines by hypertensive action of phosalone.

9204-184. Reddy Gawa Narendra, Prasad M N V (Sch Life Sci, Univ Hyderabad, Hyderabad 500 134). **Cadmium induced potassium efflux from *Scenedesmus quadricauda*.** *Bull Environ Contam Toxicol*, **49** (4) (1992), 600-605 [11 Ref].

Paper examines the exchange of K^+ with Cd^{2+} uptake in *Scenedesmus quadricauda*, and whether it follows an electroneutral 2:1 exchange or an all none process. K^+ efflux was observed during Cd^{2+} uptake, and it increased with increasing Cd^{2+} uptake into the cells. A dose related K^+ efflux was observed when *S. quadricauda* cells were treated with varying concentrations of cadmium chloride. Total K^+ content of the cells was 745 M/ kg dry wt. K^+ efflux did not follow the electroneutral 2: 1 exchange with Cd^{2+} in *S. quadricauda* Cd^{2+} uptake to K^+ efflux ratio ranged between 22 and 32. At

initial stages the ratio was 25 (10 min), 22(20 min) and reached to 32 within first 30 minutes.

9204-185. Reddy Nilakanta P, Durai Raj G, DhartS C (Biochem Lab, Centl Leather Res Inst, Adyar, Madras 600020). **Effects of different concentrations of dimethoate on the crosslinking of gingival and uterine collagen in female albino rats.** *Int J Toxicol Occupl Environ Hlth*, **1** (2) (1992), 52-56 [24 Ref].

The effects of different concentraffons of dimethoate on gingival and uterine collagen crosslinking were studied in female albino rats. The gingival and uterine, samples were collected from all groups of rats and per cent reversibility of neutral salt soluble collagen gel and the solubility of insoluble collagen in KCNs or Urea were determined. The results indicate the lower concentration of dimethoate (0.56mg/ 100 g body wt) treated rats were less affected than the higher concentration of dimethoate treated rats.

9204-186. Sahoo D K, Kar R N, Das R P (Regl Res Lab, Bhubaneswar 751013, Orissa). **Bioaccumulation of heavy metal ions by Bacillus circulans.** *Bio resources Techno*, **41** (2) (1992), 177-179 [10 Ref].

Bacterial biomas was produced by culturing polysaccharide producing Bacillus circulans in liquid medium containing glucose as carbon source. The biomass thus obtained was used to remove copper and cadmium ions from aqueous solutions. The pH of the metal solutions was found to have a pronounced effect on the metal accumulating capacity of the organism. The removal of copper and cadmium ions from metal soluffons by this bacterium was very efficient at low concentration ranges.

9204-187. Saksena S, Prasad R, Pal R C, Joshi V (Tata Energy Res Inst, 103 Jorbagh, New Delhi 110003). **Patterns of daily exposure to TSP and CO in the Garhwal Himalaya.** *Atmosphe Env*, **26A** (11) (1992), 2125-2134 [13 Ref].

Daily integrated exposure to TSP and CO was assessed by personal and stationary sampling of air in six microenvironments. Time budget surveys were conducted to determine how much time four population groups (adultwomen, children, adultmen and youth) spend in these microenvironments. Burning of biofuels in traditional unvented cookstoves is the most important anthropogenic source of pollutants in the

study area a rural and hilly region in the Garhwal Himalaya. The daily exposure of adult women to TSP and CO was estimated to be 37 mg h m⁻³ and 110 ppm h. respectively. Daily exposure, within each of the four population groups was found to be very uniform across individuals for both the pollutants. Patterns of concentrations and daily exposure as influenced by the time of the day, season and altitude are discussed.

9204-188. Sankaran M, Shariff S Dawood, Dawood Nausheem (PG Dept Zoo, The New Coll, Madras 600014). **Combined action of phenthoate and phorate on the different regions of brain, liver and kidney of rat.** *J Ecotoxicol Environ Monit*, **2** (1) (1992), 35-38 [16 Ref].

The levels of total free sugars, protein, free amino acids and lipids decreased in the different regions of the brain, liver and kidney of the rat, *Rattus norvegicus*, due to combined exposure to phenthoate and phorate. The amino acid levels show a reverse trend in the liver and kidney as compared to the brain. The results are discussed in relation to metabolic changes due to pesticide toxicity.

9204-189. Saravanan R, Selvanayagam M (Unit Environ Sci, PG Res Dept Zoo, Loyola Coll, Madras 34). **Effect of rogon 30 E on the biochemistry of haemolymph of *Ranatra filiformis*(F).** *Proc Acad Environ Bio*, **1** (2) (1992), 205-210 [18 Ref].

Aquatic hemipterans migrate during unfavourable conditions, mobilising the organic constituents to the organ of flight. Sublethal concentrations of the organophosphorous insecticide rogor 30E on the biochemistry of haemolymph of *Ranatra filiformis* reveal a drastic reduction in free sugar and protein contents of haemolymph.

9204-190. Sen Gargi, Behera Milan Kumar, Patel PN (Fisheries Lab, PG Dept Zoo, Gangadhar Mehar Coll, Sambalpur 768004). **Toxic effects of zinc on liver and brain of the fish *Channa punctatus* (Bloch).** *Env Eco*, **10** (3) (1992), 742-744 [13 Ref].

Toxic effects of zinc in concentrations of 13.18, 17.5, 21.9 and 23.07 mg/liter on brain and liver of *Channa punctatus* were evaluated. There was decrease in the cholesterol, protein and ascorbic acid content of brain in the treated fish. Likewise there was a gradual decrease in the protein and ascorbic acid content of liver.

9204-191. Sethumadhavan R, Murugupandian V, Muthusami; A (P G Dept Chem, Bishop Heber Coll, Triuchirapalli 620017). **Anodic protection of acid polluted mild steel tanks.** *J Indl Polln Contl*, **8** (1) (1992), 25-27 [4 Ref].

The pollution caused by the acidic environments in mild steel tanks is studied in terms of the rate of corrosion of mild steel tanks in such environments. Anodic protection technique is employed to control the rate of corrosion. It is seen that the rates of corrosion of mild steel tanks is greatly reduced by this method in acidic environments.

9204-192. Sharma Geeta, Nath Ravindra, Gill Kiran Dip (Dept Biochem, PG Inst Medl Edn Res, Chandigarh 160012). **Effect of ethanol on the distribution of cadmium between the cadmium metallothionein and non-metallothione in bound cadmium pools in cadmium exposed rats.** *Toxico*, **72** (3) (1992), 251-263 [19 Ref].

In an attempt to assess the effect of ethanol on cadmium accumulation, metallothionein (MT) synthesis, Cd binding capacity and lipid peroxidation, rats were administered either Cd, ethanol or their combination for a period of 4 weeks. A significant increase in Cd accumulation was observed in all the organs of rats under study co-exposed to Cd and ethanol as compared to only Cd treated rats.

9204-193. Sheela M, Muniandy S (PG Res Dept Zoo, APA Coll Sci Cult, Palani 624602). **Impact of fenvalerate on body composition, protease enzyme and proteins conversion efficiency in the fish *Cirrhinus mrigala* (Ham.).** *Env Eco*, **10** (3) (1992), 532-535 [17 Ref].

Studies on the survival of *Cirrhinus mrigala* showed that the sublethal concentrations of fenvalerate were 0.0006, 0.0008, 0.001 and 0.003 ppm. The protein intake and protein conversion efficiency decreased with increasing sublethal concentrations of fenvalerate. Protein and glycogen content in muscle and liver of *C. mrigala* decreased with increasing concentrations of the pesticide.

9204-194. Sheela M, Mathivanan R, Muniandy S (PG Res Dept Zoo, APA Coll Sci Cult, Palani 624602). **Impact of fenvalerate on biochemical status of different tissues in the fish. *Channa striatus* (Bloch).** *Env Eco*, **10** (3) (1992), 547-549 [15 Ref].

Protein carbohydrates and lipid content in gill, muscle, liver and intestine of the fish *Channa striatus* exposed to 0.0004, 0.0006, 0.0008 and 0.001 ppm of fenvalerate were estimated. Protein, carbohydrate and lipid content in these tissues decreased with increasing sublethal concentrations of the pesticide as compared to control fish.

9204-195. Sheela M, Mathivanan R, Muniandy S (PG Res Dept Zoo, APA Cult Coll, Palani 624602). **Impact of fenvalerate and phosphamidon on food intake, growth and conversion efficiency in the fish *Channa striatus*(Bloch).** *Env Eco*, **10** (3) (1992), 593-596 [15 Ref].

Studies on the survival of *Channa striatus* showed that the sublethal concentrations of fenvalerate were 0.0004, 0.0006, 0.0008, 0.001 ppm and 0.4,0.6,0.8 and 1.0 ppm for phosphamidon. The rate of feeding, absorption, growth, metabolism and conversion efficiency of *C. striatus* exposed to fenvalerate and phosphamidon decreased with increasing concentrations. Fenvalerate was more poisonous than phosphamidon.

9204-196. Shukla S P, Gupta G S (Cent Adv Std Bot, Inst Techno, Banaras Hindu Univ, Varanasi 221005). **Toxic effects of Omega chrome Red ME and its treatment by adsorption.** *Ecotoxic Environ Safety*, **24** (2) (1992), 155-163 [16 Ref].

Toxic effects of Omega Chrome Red ME, a popular textile dye, on the nitrogen fixing cyanobacterium *Nostoc calcicola* were studied. The growth of *N. calcicola* was found to be suppressed at 10 and 20 mg/liter initial concentrations of dye, whereas a low initial concentration of 5mg liter l slightly favors growth. Removal of the dye was carried out by adsorption using some cheap and unconventional adsorbents like coal, fly ash, wollast, onite, and china clay. It has been observed that, in all cases, the low adsorbate concentration, the low temperature, and an acidic medium favor the dye removal process.

9204-197. Shunmugavelu M, Sekar P (PG Dept Zoo, Vivekananda Coll, Tiruvedakam West 624217). **Impact of cadmium on protein content in the meloid beetle *Mylabris balteata* (insecta).** *J Ecotoxic Environ Monit*, **2** (1) (1992), 78-80 [11 Ref].

The effect of cadmium chloride on the protein content of different tissues of *Mylabris balteata* was studied. The protein content decreased from 47 to 15% and 15 to 5% in the ovary and fat body, respectively, while the protein content to haemolymph increased from 79 to 98%. The enhancement of protein in the haemolymph might be due to the interference of oogenesis by cadmium resulting in the non-utilization of protein by the oocytes.

9204-198. SiluvaiAntonyXavier A, Haniffa MA, De Souza Stephen T (PG Dept Zoo, St. Xavier (Autonomous) Coll, Palaynkottai 627002). **Histopathological changes in gills and ovaries of the freshwater prawn *Macrobrachium idae*(Heller) exposed to textile mill effluent.** *Uttar Pradesh J Zoo*, **12** (1) (1992), 69-71 [14 Ref].

Freshwater prawn, *Macrobrachium idae* were exposed to sublethal concentrations of textile-mill effluent. In the effluent exposed prawn the distal portion of the gill filament was congested with haemocytes showing necrosis. The follicular epithelium carrying oocyte became irregular and oocytes lost their characteristic shapes.

9204-199. Singh P B, Singh T P (Reproductive Toxicology Lab, PG Dept Zoo, Tilak Dhari Coll, Jaunpur UP). **Modulatory actions of ovine luteinizing hormone-releasing hormone and *Mystus gonadotropin* or α -BHC induced changes in lipid levels in the freshwater catfish. *Heteropneustes fossilis*.** *Ecotoxic Environ Safety*, **24** (2) (1992), 192-202 [25 Ref].

Female specimens of *Heteropneustes fossilis* were exposed to a sublethal concentration of α -BHC (16 mg/litre) for 4 weeks during the preparatory and pre-spawning phases of their annual reproductive cycle. The effect to α -BHC in general was inhibitory to lipogenesis during both of the reproductively active phases as judged by decreased levels of FFA, MG, DG and TG.

9204-200. Sinha Neelima, Lal B, Singh TP (Fish Endocrinology Lab, Cent Adv Std Zoo, Banaras Hindu Univ, Varanasi 221005). **Thyroid physiology impairment by malathion in the freshwater catfish *Clarias batrachus*.** *Ecotoxicol Environ, Safety*, **24** (1) (1992), 17-25 [46 Ref].

Effects of malathion on serum and glandular thyroxine (T₄), triiodothyronine (T₃), the T₃/T₄ ratio, peroxidase activity, and extrathyroidal conversion of T₄ to T₃ have been studied in the freshwater catfish *Clarias batrachus* during the prespawning and spawning phases of its annual reproductive cycle. Malathion inhibited T₄ secretion in the kidney, but accelerated T₄ synthesis in the pharyngeal thyroid. This pesticide also inhibited the extrathyroidal conversion of T₄ to T₃ in serum during both the studied phases.

9204-201. Sinha T K P, Kumar Kuldeep (PG Dept Zoo, Bihar Univ, Muzaffarpur 842001). **Acute toxicity of mercuric chloride to *Anabas testudineus* (Bloch).** *Env Eco*, **10** (3) (1992), 720-722 [6 Ref].

To ascertain the toxicity level of mercuric chloride to *Anabas testudineus* a series of experiments were conducted in 40 litre FRP tanks for a period of 96 hours. Fish were exposed to various concentrations of HgCl₂ (0.31.5 ppm) with water temperature ranging between 31-33.5°C. While in the control experiment no mortality occurred, at 0.3 ppm HgCl₂ fish mortality was 6.67% in 24 hours and 20% in 96 hours. With the increase in HgCl₂ concentration fish mortality increased.

9204-202. Sreedevi P, Sivaramkrishna B, Suresh A, Radhakrishnaiah K (Dept Zoo, Sri Krishnadevaraya Univ, Anantapur 515003, AP). **Effect of nickel on some aspect of protein metabolism in the gill and kidney of the freshwater fish, *Cyprinus carpio* L.** *Environ Polln*, **77** (1) (1992), 59-63 [35 Ref].

Nickel has an adverse effect on some aspects of protein metabolism of the freshwater fish, *Cyprinus carpio*. The main changes observed were decrease in soluble, structural and total proteins. AIAT and AAT activities with an increase in the levels of free amino acids, protease and GDH activities, increase in soluble, structural and total proteins, free amino acids and the activities of protease. AIAT, AAT and GDH. The magnitude in these changes increased over time with both concentrations of the metal, and was more marked in gill than in kidney.

9204-203. Srivastava A K, Das Mukul, Khanna S K (Dyes Food Adulterant Toxicology Lab, Indl Toxicology Res Cent, Mahatma Gandhi Marg, PB No. 80, Lucknow 226001). **An investigation of factors affecting recovery in victims of tricresyl phosphate induced polyneuropathy an 18 months follow up study.** *Int J Toxicol Occup Environ Health*, **1** (2) (1992), 41-45 [25 Ref].

296 subjects who had ingested tricresyl phosphate (TCP) contaminated edible oil were followed up for a period of 18 months to assess the factors affecting recovery from the polyneuropathy known to be a toxic manifestation of TCP. Oil samples revealed that TCP contamination was to the extent of 22-57 per cent. A majority of subjects (47.9%) had only partial recovery, 37.9 per cent showed complete recovery and the rest 14.2 per cent had no slight recovery. Age, nutritional status and use of alcohol were found to be important factors in respect of recovery.

9204-204. Sudhakar C, Syamalabai L, Veeranjaneyulu K (Dept Bot, Sri Krishnadevaraya Univ, Anantapur 515003). **Lead tolerance of certain legume species grown on lead ore tailings.** *Agric Ecosyst Env*, **41** (3 & 4) (1992). 253-261 [20 Ref].

The lead tolerance potential of six legume species grown on lead ore tailings was studied. The root and shoot growth revealed that bengalgram and cowpea adapted to high lead concentrations better than the other legumes. Cowpea showed a higher tolerance index than the other legumes. Chlorophyll stability indices were found to be high in cowpea and bengalgram.

9204-205. Swamy K V, Ravi Kumar R, Murali Mohan P (Div Neurobio, Dept Zoo, Sri Venkateswara Univ, Tirupati 517502). **Effects of chronic sublethal daily dosing of monocrotophos on some aspects of protein metabolism in rat brain.** *Bull Environ Contam Toxicol*, **49** (5) (1992), 723-729 [19 Ref].

The changes in soluble and total proteins, free amino acids, proteases and phosphatases were investigated in the cerebral cortex, cerebellum, hippocampus and medulla in albino rats under subacute monocrotophos toxicity. Each of the parameters studied under protein metabolism either progressively increased or decreased throughout the period of study (16 days). Behavioural normalcy was apparent at 16

days. Thus, although differing from the trend from cholinesterase inhibition the changes in protein metabolism may have their own adaptive value under monocrotophos stress. The changes were predominant in the cerebral cortex followed by other regions.

9204-206. Tulsi SJ, Yasmeen Rafath, Ramana Rao JV (Dept Zoo, Osmania Univ, Hyderabad 500007). **Biochemical changes in the haemolymph of the freshwater field crab, *Barytelphusa guerini* in exposure to organic and inorganic lead.** *J Environ Bio*, **13** (3) (1992), 261-271 [32 Ref].

Haemolymph metabolite levels were measured in the freshwater crab, *Barytelphusa guerini* during organic and inorganic lead exposure and recovery. These results suggest that if the appropriate biochemical parameters are determined at the correct time then the warning signs of distress could be detected and the aquatic fauna can be protected. Further the analysis of haemolymph biochemical parameters may serve in assessing the magnitude of lead pollution.

9204-207. Venugopal NBRK, Reddy SLN (Dept Zoo, Osmania Univ, Hyderabad 500007). **Effect of trivalent and hexavalent chromium on renal and hepatic tissue glycogen metabolism of a freshwater teleost *Anabas scarusens*.** *Environ Monit Assessment*, **21** (2) (1992). 133-140 [38 Ref].

The in vivo toxic impact of chromium in its two forms (trivalent and hexavalent) on glycogen metabolism in the liver and kidney of a fresh water teleost *Anabas scandens* was studied. In a subchronic exposure of 30 days, depletion of glycogen and glucose reserves Reflected in the activity patterns of glycogen phosphorylase 'a and ab'. While both forms of chromium induced alterations in enzyme activities and metabolite levels in the two tissues, Cr⁺⁶ exerted greater effects in the kidney.

9204-208. Vijayaraman K, Geraldine P (Dept Zoo, Periyar EVR Coll, Tiruchirapalli 620023). **Toxicity of cadmium, copper, chromium, and zinc to *Macr brachium rude*.** *Geobios*, **19** (2 & 3) (1992), 77-80 [11 Ref].

Acute toxicity of cadmium, copper, chromium and zinc to the juveniles of *Macrobrachium rude* was evaluated by static renewal bioassay. The 96 h LC₅₀ values for Cd, Cu, Cr and Zn were 0.014, 0.018, 0.635 and 3.025 mg/l, respectively. The level of toxicity was found to be Cd>Cu>Cr>Zn.

9204-209. Vijaykumar K, Paul Ravindra, Kadadevaru Girish (Dept Zoo, Karnataka Univ, Dharwad 580003). **Effect of methyl parathion on primary productivity of a freshwater pond.** *J Nature Conserv*, **4** (1) (1992), 95-97 [11 Ref].

The effect of methyl parathion on primary production of phytoplankton of pond ecosystem was studied. The gross and net production in treated samples were found decreased gradually and respiratory rate increased considerably when compared to those of control. Organophosphorous pesticides were found to be more toxic to primary production than organochloride compounds.

9204-210. Yasmeeen Naiyara, Nayeemunnisa (Dept Zoo, Bangalore Univ, Bangalore 560056). **Insecticide induced disruptions in functioning of developing brain of Rana cxyanophtitis.** *Indian J Exptl Bio*, **30** (8) (1992), 701-704 [24 Ref].

Synthetic pyrethroid insecticide permethrin significantly decreased the levels of regulatory proteins (S100 and calmodulin) in the developing CNS of Rana cynophtictis. Remarkable inhibition of enzymes acetylcholinesterase and choline acetylase and significant accumulation of neurotransmitter acetylcholine were observed in permethrin treated animals. Permethrin exposure significantly decreased the activity of phosphodiesterase. The results supports molecular disruptions occurring due to permethrin induced toxicity.

Wastes

9204-211. Ahmad M N, Ram fi N* (*Dept Chem, Fac Sci, MS Unix Baroda, Baroda 390002). **Removal of basic dye from wastewater using silica as adsorbent.** *Environ Polln*, **77** (1) (1992), 79-86 [22 Ref].

The kinetics of removal of Basic Blue 3 from a textile effluent was studied using silica as an adsorbent. The adsorption was found to follow a first order process. The influences on the rate of adsorption of various factors, such as temperature, concentration of dye solution. pH of the system and the amount of adsorbent have been

investigated. The effect of electrolytes and surfactants had also been seen on the removal of the dye from the wastewater.

9204-212. Balasubramanian P R, Kasturi Bai R* (*Sch Energy Sci, Env Nat Resources, Madurai Kamara} Univ, Madurai 625021). **Recycling of biogasplant effluent through aquatic plant (Lemna) culture.** *Bio Resource Techno*, **4** (3) (1992), 213-216 [20 Ref].

The production of the aquatic plant, common duckweed (Lemna) on slurry obtained from a KVIC model biogas plant fed on cattle waste, was investigated. The plants grew well in a 1% concentration of biogas plant effluent. The mean biomass yield was $1.06 \text{ g dry mass m}^{-2} \text{ day}^{-1}$. The crude protein content of this biomass was $16.40 \pm 2.05\%$ (dry weight). The nutrient composition of the plant was the same as plants grown on other media.

9204-213. Bharati S G, Salanki A S, Taranath T C, Acharyulu M VRN (PG Dept Std Bot, Karnatak Univ, Dharwad 580003). **Role of cyanobacteria in the removal of lignin from the paper mill waste waters.** *Bull Environ contam Toxicol*, **49**(5)(1992), 738-742 [11 Ref].

The role of cyanobacteria in the removal of lignin from the paper mill waste waters has been studied. Results indicated that on 5d lignin removal rate by *Phormidium ambiguum* was much faster than *Chroococcus minutus*. It is clear that the extracellular enzymes produced by the algae and the combined action of other chemical substances in the presence of large amount of oxygen made lignin level decrease. From the present investigation, it is concluded that the cyanobacteria have a definite role in the biodegradation of polymeric lignins.

9204-214. Bhargava D S, Sheldarkar S B (Dept Civil Engng, Univ Roorkee, Roorkee 247667, UP). **Effect of adsorbent dose and size on phosphate removal from wastewaters.** *Environ Pollut*, **76** (1) (1992), 51-60 [16 Ref].

Laboratory scale production of rinsed tamarind nutshell activated carbon (TNSAC) was done by the method of single stage chemical activation, with zinc chloride as an activation agent. Using this adsorbent, adsorption studies were conducted in agitated batch flow reactors with a fixed initial phosphate concentration and with varying adsorbent particle sizes and doses. The highest percentages adsorbed, for an adsorbent

dose of 4 g litre⁻¹, were 57% and 44% respectively, for adsorbent particle sizes of 106.1µm and 232.41µm.

9204-215. Bose Purnendu, Tare Vinod (Dept Civil Engng, Indian Inst Techno, Kanpur 208016). **Optimal design of counter and cross flow packed bed towers for ammonia removal.** *J Indian Assoc Environ Manag*, **18**(3)(1992), 253-264 [29 Ref].

Attempt is made to develop a rational approach to minimum cost design of ammonia stripping towers. Procedures for optimal design of both counter flow and cross flow ammonia stripping towers are developed. The feasibility of preheating water and/or air for improving the efficiency of ammonia removal has also been investigated.

9204-216. Chaturvedi M K (Natl Environ Engng Res Inst, Zonal Lab, 6/33 Civil Lines, Kanpur 208002). **Biodegradation of tannery effluents isolation and characterisation of microbial consortium.** *Indian J Environ Prot*, **12**(5)(1992), 335-340 [17 Ref].

Paper focusses on isolation of a strain from the Tannery and Footwear Corporation of India Ltd., Kanpur. Growth characteristics of the isolated strain on different media is investigated. Further, the paper illustrates the methods for presumptive identification of the strain. The isolated strain is used for treatment of the tannery effluents.

9204-217. Chona M K, Kapil R, Thakur I K (Dept Zoo, Punjab Univ, Chandigarh 160014). **Self purification studies in soap factory effluents.** *Himalayan J Env Zoo*, **6** (1) (1992), 74-75 [5 Ref].

Soap factory effluents get self purified when kept in well lighted place. This purification was due to appearance of biota (flagellate, ciliates, algae, diatoms) which help in increasing DO and consequently decreasing BOD.

9204-218. Dadhwal K S, Singh Bijendra Narain P (Centl Soil Water Conserv Res Trng Inst, Dehradun, U P). **Characteristics of limertone minespoil / debris from outer Himalayas of Uttar Pradesh.** *Indian Forester*, **118** (9) (1992), 650-658 [15 Ref].

Fifty two limestone minespoil/ debris samples from 20 mine sites covering four blocks viz., Bandal, Chamasari, Rajpur and Rikholi under Mussoorie hills of Uttar

Pradesh from outer Himalayas were evaluated for important characteristics. Minespoil was found neutral to alkaline in reaction, poor in fertility status, sandy loam in texture, high in CaCO_3 and bulk density and low in water holding capacity.

9204-219. Dharwadkar M M, Deshpande YH, Mahajan RD (Dept Chem, Marathwada Univ, Aurangabad 431004). **Polluted sediment cost evaluation a mathematical model.** *Proc Acad Environ Bio*, **1** (2) (1992), 121-127 [14 Ref].

A model is presented to perform a cost evaluation, for the polluted sediments by the streams flowing through the industrial area, in Aurangabad. The cost of excavation and disposal of polluted sediment to several disposable sites has been considered. The application of the system operation, probably will evolve a feasible and practicable solution to the Municipal Corporation, in solving the environmentally polluted sediment in the region under consideration.

9204-220. Fendar B S, Kharat R B (Dept Chem, Inst Sci, Nagpur 440001). **Assessment of toxic ions in wastewater of Koradi thermal power plant.** *J Indl Polln Contl*, **8**(1) (1992), 21-24 [7 Ref].

Assessment of toxic metal ions in fresh water i.e., upstream, cooling effluent, machine washings and the main stream of waste water after mixing of cooling effluent and machine washings was made. The concentration of Cu, Pb, Zn, Ni, Co, Cd and Mn in fresh water has been found to be 10.212.2, 0.851.30, 41.045.00, 3.55.8, 6.26.8, 0.200.45 and 42.350.2 $\mu\text{g/ml}$ respectively.

9204-221. Gupta A K, Shukla B S (Cheml Lab, Agra Coll, Agra). **Zinc oxide catalysed photooxidation of phenols in the petroleum refinery waste waters.** *Acta Ecologtca*, **14** (1) (1992), 18-21 [10 Ref].

Exposure of petroleum refinery waste waters to sunlight in the presence of zinc oxide resulted in rapid degradation of phenol at 30°C . The rate of degradation increased with zinc oxide concentration and decreased with increasing initial concentration of phenolics in the effluents.

9204-222. Gupta R K (Dept Bot, PG Coll, Ghazipur 233001). **The anoxygenic photosynthetic capability of a cyanobacterium *Oscillatoria subbrevis* isolated from opium factory effluent.** *J Indian Botl Soc*, **70**(1991), 425-426 [7 Ref].

The liquid opium effluent of Government Opium & Alkaloids Works, Ghazipur, U.P contains sulphur compounds which on stagnation decompose into H₂S gas, giving an offensive odour. Paper reports anoxygenic photosynthesis in a predominately oxygenically photosynthesizing filamentous, non-heterocystous cyanobacterium *Oscillatoria subbrevis* isolated from opium effluent affected habitat.

9204-223. Kannan N, Vallinayagam P (Ayya Nadar Janaki Ammal Coll, Dept Chem, Sivakasi 626124). **Correlation analysis of water quality parameters of industrial effluents match industry.** *Indian J Environ Prot*, **12**(7)(1992), 521-527 [13 Ref].

Industrial effluents have been collected from different match units and analysed bimonthly for a period of 8 month. Physico chemical water quality parameters are found to be well above the permissible levels. The computed water quality index (WQI) values indicate highly polluted nature of the effluents. Correlation analysis of water quality parameters have been carried out among all possible pairs of quality parameters of match industry effluents.

9204-224. Karthikeyan J, Niranjana P (SW Coll Engng, Dept Civil Engng, Tirupati 517502). **Colour removal from dye effluents by chemical coagulation: 1 acid and direct dyes.** *Indian J Environ Prot*, **12**(7)(1992), 497-502 [9 Ref].

Removal of colour from 2 acid dyes and 2 direct dyes by chemical coagulation with alum, ferric chloride, ammonium ferrous sulphate and lime was investigated in the laboratory. Monoazo acid red did not respond favourably to chemical coagulation, where as all other dyes exhibited good removal. Test solution pH has no influence in effecting colour removal, however, high pH values resulted in low coagulant dose requirements.

9204-225. Kaul S N, Nandy T, Bhole A G (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 20). **Evaluation of design parameters for anaerobic rotating biological drum contactor treating paper mill effluent.** *J Environ Sci Hlth*, **A27** (7) (1992), 1589-1618 [14 Ref].

A bench scale investigation was undertaken to evaluate the technical attributes of an-aerobic rotating biological drum contactor for bio-methanation of waste paper based paper mill effluents. The paper herein is concerned with the application of various models to experimental data to determine the design parameters for the reactor system in reference to substrate biooxidation, biomass growth and biogas yield.

9204-226. Khan A N, Bal A S (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Low cost sanitation for rural communities.** *Asian Env*, **14**(1) (1992), 8-25 [7 Ref].

Sanitation for rural comprises provision of safe drinking water and disposal of human excreta, animal dung and agriculture waste in a safer manner to avoid nuisance and danger to health. This objective can be achieved through low cost sanitation technologies which are simpler and cheaper as also socially acceptable.

9204-227. Khan SA, Anil Kumar T, Bandyopadhyay M, Rao C U (Dept Civil Engng, Indian Inst Techno, Kharagpur, WB). **Denitrification in anaerobic filters with burnt clay hollow cylindrical medium.** *J Inst Public Hlth Engrs, India*, **1992** (1) (1992), 24-35 [8 Ref].

Two filters packed with burnt clay hollow cylindrical shaped filtering media were used in this study. Leachate was used as substrate in one filter and sucrose with nutrients in the other. Denitrification was studied at different hydraulic and organic loading rates. Optimum hydraulic and organic loading for maximum denitrification were found for leachate and sucrose.

9204-228. Loomba Komal, Pandey G S (Ravishankar Univ, Dept Chem, Raipur492010). **Removal of mercury from chloralkali plant effluent using granulated slag of steel plant.** *Indian J Environ Prot*, **12** (7) (1992), 528-530 [15 Ref].

Granulated slag of a steel plant when added to a solution of mercuric salt was found to remove the mercuric ions by two processes: as mercuric sulphide because of the presence of sulphide in the slag matter, and as elemental mercury on account of electrochemical reduction caused by the presence of reactive metals. One gram of the slag was found to remove about 70 mg of the mercuric ions in a 7 day period.

9204-229. Loomba Komal, Pandey G S (Dept Chem, Ravishankar Univ, Raipur, MP492010). **Chromate reduction using granulated slag from a steel plant.** *J Environ Sci Hlth*, **A27** (4) (1992), 1149-1155 [12 Ref].

A convenient and economic method for the removal of chromate by reduction using granulated slag from a steel plant has been studied. It was found that slag can reduce up to a tenth of its weight in chromate in seven days. Paper also determines the levels for optimum chromate removal in the acidity of the medium, the concentration of chromate ions, and the flow rate of the chromate solution through a slag packed column.

9204-230. Manoharan C, Subramanian G (AWM Sci Pushpam Coll, PG Dept Bot, Poondi, Thanjavur 613503). **Sewage cyanobacterial interaction a case study.** *Indian J Environ Prot*, **12** (4) (1992), 251-258 [32 Ref].

Changes in the physicochemical characteristics of domestic sewage brought about by inoculating *Ossillatoria pseudogeminata* var *unigranulata* under laboratory conditions have been studied in detail. Considerable reduction in BOD and COD and removal of various nutrients have been observed. Influence of domestic sewage on the photosynthetic process, nitrogen metabolism and biochemical components, such as carbohydrates, proteins and lipids of the organism has also been discussed.

9204-231. Mishra P C, Panda Madhumita, Patel R K, Mohapatra M K (Sch Life Sci, Sambalpur Univ, Jyotivihar 768019, Orissa). **Physicochemical and biochemical changes in ground water and soil during land treatment of paper mill water.** *J Ecotax:o Environ Monit*, **2**(1)(1992), 61-73 [15 Ref].

Land treatment of paper mills wastewater for a period of one year had no negative effect on ground water quality indicating that the soil acts as a good filter. There was considerable reduction in suspended particles, BOD and COD in the wastewater collected from an intercepting drain after land treatment. There was little variation in physicochemical characteristics of soil whereas the dehydrogenase activity and microbial count showed a negative trend.

9204-232. Namasivayam C, Kanagarathinam A (Environ Chem Div, Dept Environ Sci, Bharathiar Univ, Coimbatore 641046, Tamil Nadu). **Distillery wastewater treatment using Fe³⁺/Cr³⁺ hydroxide sludge and polymer flocculants.** *J Environ Sci Hlth*, **A27**(7) (1992), 1721-1737 [20Ref].

Combination of the waste Fe³⁺/ Cr³⁺ hydroxide sludge and polymer flocculant used in the treatment of distillery wastewater yielded good results. Fe³⁺/ Cr³⁺ hydroxide sludge and polymer flocculants were, not effective, when used separately. Various parameters like turbidity, colour, COD, chloride, potassium, sodium, calcium and BOD. Among various polymer flocculants used, anionic polymer RF-440 in combination with Fe³⁺/ Cr³⁺ hydroxide sludge gave a maximum removal of turbidity (71%), COD (50%), chloride (20%), potassium (48%) calcium (42%) and BOD (40%).

9204-233. Namasivayam C, Ranganathan K (Dept Environ Sci, Bharathiar Univ, Coimbatore 46, Tamil Nadu). **Treatment of dairywaste water using waste red mud.** *Res Ind*, **37** (3) (1992), 165-167 [13 Ref].

Red mud, a waste material obtained from aluminium factory in the processing of 11 uauxite ore, has been used as flocculant in the treatment of dairywaste. Its efficiency is compared with the conventional flocculant, alum. Red mud removed 77.71,65,73 and 95 per cent of turbidity, BOD, COD, oil and grease, and bacterial count respectively at a dosage of 1304 mg per litre of effluent.

9204-234. Namasivayam C, Ranganathan K (Environ Chem Div, Dept Environ Sci, Bharathiar Univ, Coimbatore 641046). **Waste Fe³⁺/ Cr³⁺ sludge as flocculant for the treatment of dairy wastewater.** *Bioresowce Techno*, **40** (3) (1992), 209-213 [20 Ref].

Variation in the characteristics of dairy, waste water with storage time is shown. The efficiency of Fe³⁺/ Cr³⁺ sludge, is compared with the conventional flocculants, ferric chloride and ferrous sulphate, in the treatment of dairy wastewater. The percentage removals of turbidity, BOD, COD, oil and grease and total phosphate were 81±5, 68±5, 70±5, 52±5 and 70 ±5 respectively by 1.043 g dosage of sludge per litre of the effluent, and the pH of the treated water was 5.7.

9204-235. Narayana Swamy G, Suryanarayana A (Natl Inst Oceanogr, Dona Paula, Goa 403004). **Near shore circulation in relation to effluent disposal off Thal, Maharashtra, west coast of India.** *Mahasagar*, **25** (1) (1992), 31-38 [5 Ref].

Tides, currents and related field parameters at Thal, Maharashtra coast, were studied to assess the environmental conditions for proper disposal of effluents from a large fertilizer factory. A composite picture of the flow pattern has been prepared for the three prominent seasons. The waters beyond Khanderi island described a course roughly parallel to the shore, whereas shallower water exhibited crossshore tendencies and irregularities, rendering them unsuitable for systematic effluent disposal, as also the southern and middle regions due to limitations in dispersive processes.

9204-236. Nayak B K, Prusty P,K, Singh C R P (Wadia Inst Himalayan Geo, Dehra Dun 248001). **Environmental impact and possible economic application of phosphatic wastes from Maldeota Mine, Mussoorie Dehradun.** *J Himalayan Geo*, **2** (1) (1991), 87-90 15 Ref].

In Maldeota, phosphate mining activities produce two kinds of waste materials tailings and sludge. Size and major element distribution pattern studies for the tailings follow the principle of beneficiation in a slurry form whereas, those for the sludge are governed by the mechanism of transportation by water medium. While the tailings are recovered occasionally, sludge is produced daily in sufficient quantities, the latter creating problems of dumping site and pollution of fresh river water.

9204-237. Park Hee-Jung, Bhargava D S (Dept Civil Engng, Univ Roorkee, Roorkee 247667). **Environmental impacts of solid waste incineration.** *Indian J Environ Prot*, **12**(6) (1992), 401-408 [32 Ref].

Incineration has been considered as one of the best modes of solid waste disposal. While this method of disposal has several advantages, it also causes some environment related adverse impacts, particularly in respect of the gaseous pollutants released into the environment. This paper makes a discussion of such impacts.

9204-238. Prasad B M, Chand Dinesh (Centl Bd Contl Water Polln, East Arjun Sagar, Delhi). **Studies on high rate anaerobic digestion and succeeding polishing units.** *Asian Env*, **14** (1) (1992), 26-51 [12 Ref].

The kinetic constants of anaerobic digesters under the least and the most stressed conditions and their performance in terms of methane formation and volatile fatty acid (VFA) accumulation have been evaluated. The performance of the polishing units following the roughening digesters with special reference to maximum COD removal, maximum methane formation, and the effect of wall growth over the performance of the molasses digester have also been studied.

9204-230. RaJnarayan C N (LarsenToubro Ltd, Mount PoonamalleaRd, Manapakkam, Madras 600089). **Wastewaters reuse a case study.** *Indian J Environ Prot*, **12** (4) (1992), 270-280 [18 Ref].

Paper presents a feasibility study on reuse of domestic wastewater for non-potable purposes at the Indian Institute of Technology, Bombay. Studies were carried out to check an overall effluent quality and its suitability for various types of reuse. It was found that the treated effluent was suitable for a variety of uses such as toilet flushing, cooling tower make up water, low pressure steam production, irrigation and gardening.

9204-240. Saha B, Chakraborty C, Mukherjee P K, Santra S C (Dept Bot, Univ Calcutta, Calcutta). **Studies on successional changes of plant community of waste dumps of coal mines.** *J Indian Botl Soc.*, **70** (1991), 71-74 [11 Ref].

The early successional plants are herbaceous, ruderals with C4 anatomy and peripherally spread root systems. The late successional ones show maximum vegetative growth in the postmonsoon period as compared to the summer vegetative growth of the early successional species. While grasses and weedy herbs establish themselves on open spaces, shelters provided by boulders facilitate the growth of tree species; the propagules of all originate from surrounding areas.

9204-241. Sharma R K, Kothari R M (Thaper Corporate Res Dev L Cent, Biotechno Div, Patiala 147001). **Toxicity of water and wastewater.** *Indian J Environ Prot*, **12** (4) (1992), 291-296 [9 Ref].

The presence of chemicals in optimal concentration catalyzes vital functions of living systems by acting as activators/cofactors of specific biocatalysts and their presence in sub optimal concentrations retards the rate of biochemical reactions and their total absence arrests the biochemical reactions thereby limiting the growth or even ceasing the life. Paper presents the concept of toxicity based on threshold value and discusses about water as a medium to be the cause of toxicity.

9204-242. Sharma Y C, Rupainwar D C, Updhyay S N, Prasad G (Water Polln Res Lab, Dept App Chem, Inst Techno, Banarasi Hindu Univ, Varanasi 221005). **Removal of cadmium from aqueous solutions: economically viable adsorption.** *Cheml Environ Res*, **1** (1) (1992), 95-101 [21 Ref].

Studies on the removal of Cd(II) by adsorption on a non-conventional and economically viable adsorbent, china clay have been undertaken. The effect of pH has been explained on the basis of significant surface complexation reactions operating during the process of uptake. The process of uptake has been found to be exothermic with a maximum removal at 30°C. China clay has been found to be an effective adsorbent for the removal of Cd (II).

9204-243. Singh R, Singh B P (Natl Metallurgi Lab, Jamshedpur 831007). **Environmental Pollution by mill tailings and control methods.** *Indian J Environ Prot*, **12** (5) (1992), 329-334 [19 Ref].

The visual effects on the landscape of tailing disposal, the major ecological effect is water pollution, due to the discharge of water contaminated with solids, reagents, heavy metals, sulphur compounds, etc. Various methods of disposal of tailings to minimise their adverse effects, are examined. Some possibilities including the treatment of tailings, recycling of tailing water, and the design and construction of tailings dam have been discussed.

9204-244. Swaminathan K Gurusamy R, Pongaliappan S (Dept Bot, Kongunadn Arts Sci Coll, Coimbatore 641029). **Utilization of alcohol and chemical industry effluent as liquid fertilizer for crop plants.** *Proc Acad Environ Bio*, 1 (2) (1992), 147-151 [5 Ref].

Alcohol and chemical industry effluent was rich in plant nutrients like organic carbon, nitrate, nitrite, phosphate, iron, magnesium, sulphate, calcium, sodium, sulphur, copper and zinc necessary for plant growth. When the effluent was used for irrigation of the test plant *Solanum lycopersicum*, the germination capacity of the seeds and plant growth were stimulated. The chlorophyll pigment content of the effluent irrigated plants were high when compared to water irrigated plants.

9204-245. Swaminathan L, Manonmani K, Sarojini B (Dept Bot, Kongunada Arts Sci Coll, Coimbatore 641029). **Studies on the toxicity of South Indian viscose factory effluent on groundnut) *Arachis hypogea*.** *J Environ Bio*, 13 (3) (1992), 253-260 [8 Ref].

The physico-chemical analysis of the viscose factory effluent revealed large amounts of total suspended and dissolved solids. The effluent lacked dissolved oxygen. The salts were also present in very high concentrations. This effluent did not affect seed germination but significantly inhibited the plumule development in *Arachis hypogea*.

9204-246. Upadhyay RaJiv, Pandey G N (U P Polln Contl Bd, 257, Janakpuri Bareilly, U P). **Pollution control in viscose industry through recovery of zinc from effluent.** *J Indl Polln Contl*, 8 (1) (1992), 1-9 [13 Ref].

For the recovery of zinc from viscose rayon effluent three methods have been employed, i.e., chemical precipitation, ion exchange and solvent extraction method. In the laboratory investigations, the chemical precipitation method is found to be most effective as well as economical especially when the acidity of the effluent is below 3800 mg/l. The maximum precipitation of zinc was obtained at pH 9.2

9204-247. Venkataraman Jayshree, Kaul S N, Satyanarayan Shanta (Natl Environ Engng Res Inst, Nagpur 440020). **Determination of kinetic constants for a two stage anaerobic upflow packedbed reactor for dairy wastewater.** *Bioresource Techno*, 40 (3) (1992), 253-261 [11 Ref].

A two stage upflow packed bed system was used for the treatment of dairy wastewater. Nylon pads were used as supporting media for the biomass. This investigation aimed at the determination of various kinetic constants for substrate biomass and biogas based on various models.

9204-248. Wasay S A (Min Env Forests, Paryavaran Bhavan, CGO Complex, Lodi Rd, New Delhi 110003). **Leaching study of toxic trace elements from flyash in batch and column experiment.** *J Environ Sci Hlth*, **A27** (3) (1992), 697-712 [4 Ref].

Leaching of trace elements generated from flyash of coal based thermal power plants was studied in a batch and column experiments at pH 6.0 with detention time of 20 hrs. and flow-rate of 10 ml/hr respectively. The leaching was carried out at various poring volume of distilled water at pH 5.0. It was found that the metals in the leachate decreases as the number of pore increases. The concentration of these metals in flyash were determined after extracting with water at pH 6.0 in a batch experiment at different intervals of shaking time. Average percentage of leachatable toxic metals found to be 44.7% for batch and column study.

9204-249. YadavKR (DeptAnim Nut, CollAnim Sci, HaryanaAgfil Univ, Hissar 125004). **Control of environmental pollution by recycling of processed animal wastes as cattle feed.** *J Eco-toxico Environ Monit* **2** (1) (1992), 39-45 [13 Ref].

To control contamination and environmental pollution efforts were made to utilize sun-dried animal wastes by the ruminants. The dry matter digestibility of the diets decreased significantly (<0.05) in the experimental groups as compared to control groups. No significant difference in the dry matter and dry matter intake/100 kg body weight was observed. Body weight gain was noticed in control groups.

Forestry and Environment

9204-250. Arsikere Kumar S, Parameswarappa S (Oiz Eice Conservator Forests (Dev), Socl Forestry, Aranya Bhavan, Bangalore 3). **Ecorestoration on surface mining areas and mill tailing dumps.** *Myforest*, **28** (2) (1992), 209-214 [13 Ref].

Karnataka State is rich in mineral resources. Both surface mining and deep mining are in vogue. Ecorestoration on disturbed soils and tailing dumps is of recent origin. Paper deals with ecorestoration on disturbed land and recommends a levy on product value for research and restoration.

9204-251. Bangarwa K S, Puri Sunil (Dept Agroforestry, Haryana Agril Univ, Hissar 125004). **Forest tree improvement strategies in India,** *Myforest* **28** (2) (1992), 179-187 [20 Ref].

Sufficient genetic diversity exists in Indian tree species which is useful to attain large genetic gains. Success in the establishment and productivity of forest tree plantation is determined largely by the species used and source of seed within species. Selection of best provenance and then selection of superior tree from pest provenance form the foundation for seed orchard. Progress of forest tree improvement work in different parts of India has also been discussed.

9204-252. Bhattacharjee K Craining Associate (Agronomy), Divyayan Vigyan Kendra, Rama Krishna Mission Ashram, Ranchi, Bihar). **Jajoba; A plant for arid wastes.** *Wastelands News*, **7** (4) (1992), 15-17.

The paper discusses unique properties of Jaloba (*Sinunandisiachinensis*) or goatnut plant, as a suitable plant species, that would grow on wastelands without large inputs and yielding range of valuable products. The plant when cultivated on a wide scale is expected to raise new industry based on its seed oil, which is unique among vegetable oils with high natural purity and molecular simplicity. The oil can be used as an intermediate in variety of commercial products such as disinfectants, surfactants, detergents, lubricants, driers, emulsifiers, resins, plasticizers, protective coatings, fibres corrosion inhibitors and bases for creams ointments antifoamers and several other products.

9204-253. Dagar J C, Kumar Virendrsa (Centl Agril Res Inst, Port Blair, Andaman). **Agroforestry for Bay Islands.** *Indian Forester*, **118** (6) (1992), 411-415 [3 Ref].

Agroforestry is as relevant, meaningful and useful for Bay Islands as it is for any other part of country. Climate, topography, accessibility and cultivation condition of the islands are different than the rest of the country and so are the agroforestry systems and some of them are quite specific to the islands. Large natural; forest area, climate, topography, accessibility, local needs and land holding conditions strongly influence on fitness of agroforestry system for the islands. Suitable tree, shrub and herb species for different agroforestry systems are mentioned.

9204-254. Emmanuel C J S K, Kapoor M L, Sharma V K (Div Genetics Tree Propagation, Forest Res Inst, Dehra Dun 248006). **Three decades of forest genetics and tree improvement.** *Indian Forester*. **18**(7)(1992), 489-500 [56 Ref].

Paper summarizes the research work carried out on forest genetics and tree improvement of important forest tree species by Forest Research Institute, Dehra Dun and its sister organizations during the past three decades under different projects/schemes. Different methods of genetic improvement viz. selection, hybridization, induced polyploidy and induced mutagenesis, were tried. This task also involved the selection of plus trees, creation of seed production areas, establishment of seed orchards, and laying of provenance trials etc.

9204-255. Gupta Chandra, Dwivedi AK, Shivkumar Padminice Conservator of Forests, Seed Res, Lucknow, U P). **Forest tree improvement programmes in Uttar Pradesh.** *Indian Forester*, **118** (6) (1992), 389-393 [2 Ref].

In U.P., Tree Improvement Programme is being undertaken in the three regions of Silviculture i.e. Hills, Sal and Southern region. This paper includes the improvement programme of Shisham being carried out in the Forest Genetics Section, F.R.L. Kanpur. The preliminary results indicate that there are advantages in Forest Tree Improvement Programmes.

9204-256. Negi P S (Wadia Inst Himalayan Geo, Dehra Dun 248006). **Economic forest resources of Garhwal Kumaon Himalaya.** *Indian Forester*, **118** (8) (1992), 583-592

The economic forest resources of the Garhwal Kumaon Himalaya (Uttarakhand), has been explored in the present paper with special reference to medicinal and other economic plants which may be used to boost the economy of the region and in providing local employment. The paper also throws light upon those factors whose study would be useful in Reflecting more clear and distinctive idea about the areas of the study.

9204-257. Palit S (Office Conservator of Forests, Socl Forestry, Calcutta W.B.). **Peoples participation in forest management.** *Indian Forester*, **118** (7) (1992) 447-455 [6 Ref].

An attempt has been made to focus on the different aspects of participatory management, e.g. policy changes, institutional arrangements, equity issues, input packages, macro-planning, research needs, etc. It has further been suggested that at the initial stages to ensure continuity, it is better to implement the programmes through a project.

9204-258. Pant D N, Das K K, Roy P S (Indian Inst Remote Sensing, Dehra Dun 248001). **Mapping of tropical dry deciduous forest and landuse in part of Vindhyan range using satellite remote sensing.** *J Indian Soc Remote Sensing*, **20** (1) (1992), 9-20 [9 Ref].

Landsat TM FCC of 1: 250,000 scale was visually analysed with respect to forest vegetation types, crown density and structure along with other landuse/land cover classes. Except *Shorea robusta* (Sal) and *Liverstroemiaparuiiflora* (Lendia) all forest vegetation types show higher percentage of degradation and understocked condition with respect to their aerial extent under study. Overall classification accuracy of the forest types has been found to be 88.94%.

9204-259. Porwal M C, Roy P S (Indian Inst Remote Sensing, Dehra Dun 248001). **Vegetation type discrimination on landsat T M data in heterogeneous forested landscape of Western Ghatr accuracy evaluation from largescale aerial photo maps.** *J Indian Soc Remote Sensing*, **20** (1) (1992), 21-23 [11 Ref].

Forest type classification using Landsat T M False Colour Composite (FCC) bands 2, 3, 4 has been evaluated for mapping high heterogeneous forest environment of Western Ghats (Kerala). Visual interpretation of Landsat TM FCC has been carried out to identify bioclimatic vegetation types. For comparison, aerial photomap classes have been aggregated to match with Landsat T M derived map. The overall classification accuracy of the forest types for the study area was 88.33%.

9204-260. Ramakrishnan P S (Sch Environ Sci, Jawaharlal Nehru Univ, New Delhi 110067). **Tropical forests: exploitation, conservation and management.** *Env Dev: Impact of Sci on Society*, **166** (1992), 149-162 [15 Ref].

Tropical forests, an important natural resource used traditionally on a sustainable basis by the local communities, are currently under serious threat due to overexploitation. Conservation and management represent two sides of the same coin and need to be tackled through a broadly based interdisciplinary approach with interacting components: silvi cultural, ecological, social and economic. Only such a strategy would ensure people's participation and ecologically sustainable management of this valuable resource.

9204-261. Sharma S D., Prasad K G, Rai Lajpat, Malik Naresh (Div Eco Conserv, Forest Res Inst, Dehra Dun). **Development of technology for afforestation of sodic soils. I. leguminous species.** *Indian Forester*, **118** (8) (1992), 547-549 [12 Ref].

In order to develop technology for afforesting highly sodic wasteland soils, field experiment consisting of four soil management treatments with and without drainage channel on five species was laid out on sodic (pH 9.7, conductivity 1.3 ds/m) Revar soils of Kurukshetra Forest Division in Haryana. The best results could be obtained mixing original soil with 3 kg gypsum, 2 kg ricehusk, 590g urea (in three split doses), 50g single superphosphate, 25g muriate of potash, 0.2g zinc sulphate and 5g B H C.

9204-262. Sundararaj R, Chinnathurai A K (Office Conservator Forests, Coimbatore, Tamil Nadu). **Technology packages for reclamation and development of wastelands.** *Indian Forester*, **118** (9) (1992), 609-615 [6 Ref].

In wasteland afforestation utmost care should be taken for selection of proper species. In social forestry, failure in plantation can be brought down by soil testing and

selecting suitable species with some reclamation measures. Experiments in Tamil Nadu indicate that *Casuarina* performs well in mine spoils. *Acacia planifrons*, *Acacia mellifera* and *Casuarina junghuniana* could be used in drought prone area.

9204-263. Sundryal R C (Dept Bot, Govt P G Coll, Kotdwara (Garhwal) 246149, U.P.). **Alpine vegetation of the Garhwal Himalaya.** *J Indian Botl Soc*, **70** (1991), 79-85 [24 Ref].

Ecological investigations of Bugyal (alpine meadow) was carried out to study the floristic composition, species association, biomass production, efficiency of energy capture and carrying capacity, 9 and 18 species were recorded at leveled and inclined sites respectively. Topography influences microenvironment of a particular area and thus modify vegetation composition and production of plant communities. The study revealed 22 positive and 3 negative plant species associations.

Wildlife

9204-264. Chakrabarti Kalan (Wildlife Preservation Div, Eastern Region, Calcutta 700020). **Export of wildlife and products from Calcutta Port an in depth study.** *Indian Forester*, **118** (8) (1992), 534-546 [2 Ref].

The significant export activity persisted during 1978 though with diminishing amplitude. But since 1979 there was a sharp fall in export activity and then year after year export is getting drastically reduced. This is primarily because of various restrictions imposed for export on wildlife and products by the authorities. The export data collected during the years 1975 to 1988 from Calcutta Port are presented in this paper. It includes the data on export by air, sea and postal parcels. The analysis of the data brings out revealing facts on different components of export.

9204-265. Gupta R C, Kumar Suresh (Dept Zoo, Kurukshetra Univ, Kurukshetra 132119). **On the home range of free ranging rhesus monkeys *Macaca mulatta* (Zimmermann) in Saraswati and Veer Sonti forests in haryana.** *J Nature Conserv*, **4** (1) (1992), 25-30 [10 Ref].

The home range of free ranging rhesus monkeys is limited to a minimum.251 Km² and maximum 1.575 Km². The mean home range of all the six troops comes out to be 0.864 Km². The home range domain is given bigger contours primarily due to the urge of the animals to choose a far off place as the centre of diel activity. The monkeys choose tall trees as perching objects in the wake of potential danger in the daytime.

9204-266. Gupta Rohtash Chand, Bhardwaj Chander Sekhar (Dept Zoo, Kurukshetra Univ, Kurukshetra 1321 19). **Investigations into the daily life schedule of Indian Blackbuck Antelope *cervicapra Linnaeus Geobtos*,** **19** (4) (1992), 150-156 [5 Ref].

Diurnal variations in the behavioural patterns and grazing activities of Indian blackbuck Antelope *cerstcapra* have been studied at Deer Park, Pipli situated at North of Delhi. Studies reveal that diel activity is polyphasic and photo-thermally regulated in black buck. Grazing is done in two phases i.e. in the morning and afternoon. Intense grazing takes place for an hour with a peak activity in the morning hours.

9204-267. Ranjit Daniels R J (Cent Ecol Sci, Indian Inst Sci, Bangalore 560012). **Island biogeography and the birds of the Lakshadweep archipelago, Indian Ocean.** *J Bombay Nat Hist Soc*, **88** (3) (1991), 320-328 [16 Ref].

The results of a brief survey of the birds on five islands of the Lakshadweep archipelago, Indian ocean, have been discussed. These islands are impoverished with regard to their terrestrial habitats and as a result, the number of resident land-birds and inland water-birds. On the islands surveyed, 124 species of land-birds and inland water-birds appear to be residents though direct evidence of breeding is available for only a few of these. The larger islands have a larger number of these resident birds than the smaller. The species area model predicts between 9 and 20 species of resident land-birds on the entire archipelago. The effect of distance from mainland on the avifauna of the islands is obscured by the area.

Energy and Environment

9204-268. Chanalya H N, Borgaonkar Sushama, Rajan M G C, Wahi M (ASTRA, Cent Application Sci Techno Rural Areas), Indian Inst Sci, Bangalore 560012). **Two phase anaerobic digestion of water hyacinth or urban garbage.** *Bioresource Techno*, **42** (2) (1992), 123-131 [10 Ref].

Diphasic fermentation of water hyacinth or garbage to biogas was tried by coupling a solidphase acidogenic system (TS 2030%) to an upflow, anaerobic packedbed, methanogenic digester. A daily sprinkling of the biomass bed with an aqueous suspension of biodegrading bacteria resulted in accumulation of intermediate volatile fatty acids (VFA) in the sprinkling liquid which gradually lowered the pH to about 5 and suppressed methanogenesis in the biomass bed. This process overcomes problems associated with feeding, control of floating scum and continuous/semicontinuous operation normally encountered when untreated biomass feeds are used in conventional biogas digesters.

9204-269. Chary V Srinivas, Malhotra Preety Cata Energy Res Inst, 9, Jor Bagh, New Delhi 110003). **Energy consumption in the transportation sector and its environmental implications: a case study of Delhi, India.** *Encology*, **6** (11)(1992), 718 [8 Ref].

This paper on the transportation sector in Delhi aims to analyze the consumption of gasoline and diesel in 1990/91 and forecast the same for the year 1994/95 and 2000/01. Resultant pollution levels are also estimated. The total emissions are translated into concentration levels to get an indication of the quality of air in Delhi. This is accomplished by the use of the Proportional Air Quality Model. The prime objective is to arrive at an optimal transport policy, which contains the future growth of fuel consumption as well as pollution. This will meet the twin objectives of conserving foreign exchange and a relatively clean environment.

9204-270. Jain Rajendra Kumar (Natl Botl Res Inst, Lucknow, 226001, UP). **Fuelwood characteristics of certain hardwood and softwood tree species of India.** *Bioresource Techno*, **4** (2) (1992).

Twenty-six perennial species growing in their natural habitat in Central India and 16 indigenous and exotic Pinus species from the Himalayan region at Kalika were collected for screening fuelwood properties, calorific value, density, ash, silica, moisture, nitrogen, volatile matter and Fuel Value Index. The results suggest that Wood for diafruticosa, Gardenia turgida, Gardenia resinifera, Litsea sebifera, Acacia donaldi, Wrightia tinctoria, Alanagium savifolium, Sterblus aspper, Mitragyna parvifolia and Lagerstroemia parviflora have good fuelwood properties among perennial hardwoods and Pinus oocarpag Binuspatula, Pinuspseudostrobus and Pinus ponderosa are desirable softwood species.

9204-271. Jain S K, Gujral G S, Jha N K, Vasudevan P (Cent Rural Dev Appropriate Techno, Indian Inst Techno, Hauz Khas, New Delhi 110016). **Production of biogas from Azolla pennata R. Br and Lemna minor L.:** Effect of heavy metal contamination. *Bioresource Techno*, **4** (3)(1992), 273-277[29 Ref].

The absorption of iron, copper, cadmium, nickel, lead, zinc, manganese and cobalt by Azolla pennata R. Br and Lemna minor L., and subsequent utilization of this biomass for production of biogas (methane), have been investigated. Iron and manganese did not have any toxic effect on the anaerobic fermentation of Azolla and Lemna, while copper, cobalt, lead and zinc showed toxicity. At low concentrations cadmium and nickel showed a favourable effect on the rate of biogas production and its methane content, but with increase in concentrations rate of biogas production and methane content decreased.

9204-272. Kalia V C, Kumar A, Jain S R, Joshi A P (CSIR Cent Biochem, Mall Rd, Univ Campus, Delhi 1 10007). **Biomethanation of plant materials.** *Bioresowce Techno*, **4** (3) (1992), 209-212 [12 Ref].

Apple pomace and vegetable waste were subjected independently and also in succession to anaerobic digestion inoculated with cattle dung, on a laboratory scale. Each Wilogram (dry weight) of apple pomace fed could generate 275l of biogas (57%

CH₄), fresh vegetable waste generated 210l of biogas (72% CH₄) and rotten cabbage led to the generation of 201 of biogas (68%CH₄). Adaptation of methanogens to changing feed material was also observed.

9204-273. Saxena A, Garg S K, Verma J (Dept Microbio, Coll Basic Sci Humanities, GB Pant Univ, Agril Techno, Pantnagar 263145, Nainital, UP). **Simultaneous saccharification and fermentation of waste newspaper to ethanol.** *Bio resource Techno*, **42** (1) (1992), 13-15 [17 Ref].

Cellulase produced by *Trichoderma reesei* (M 9414) exhibited higher filter paper enzyme (FPase) and endo 1, 4glucanase (Cx) activities when grown on 1% (w/v) microcrystalline cellulose powder than when grown on untreated or alkali-treated newspaper substrates. The simultaneous one step saccharification of alkali-treated newspaper using *T. reesei* cellulase and fermentation to ethanol by *Saccharomyces cerevisiae* gave increased ethanol with increased substrate up to 5% paper, the maximum used.

9204-274. Sharma Vivek (Bot Dept, Coll Sci, ML Sukhadia Univ, Udaipur, Rajasthan). **Effect of cement dust pollution on the energy status of herb layer around Lani Cement Works, Sirohi, Raj).** *Acta Ecologica*. **13** (2) (1991), 96-98 [12 Ref].

Energy content of above ground part and below ground parts of the herbaceous plants growing around cement factory have shown that grasses show an increase in the energy content in above ground as well as below ground parts.

9204-275. Singh V P, Singh J S* (*Ecosystems Analysis Lab, Dept Bot, Banaras Hindu Univ, Varanasi 221005). **Energetics and environmental costs of agriculture in a dry tropical region of India.** *Environ Manag*, **16** (4) (1992), 495-503. [18 Ref].

Present article, based on a study of five village ecosystems, assesses the energy efficiency of rain fed agriculture in a dry tropical environment and the impact of agricultural activity on the surrounding natural ecosystems. Energy requirements of five studied agroecosystems are subsidized considerably by the surrounding forest in the form of fodder and firewood. Natural ecosystems supply about 80%95% of fodder needs and 81%100% of fuelwood needs. The output-input ratio of agriculture indicated that, on average, 4.1 units of energy are expended to obtain one unit of agronomic energy. Of

this, 3.9 units are supplied by the natural ecosystem. In addition, 38% of the extracted firewood is marketed.

Plant and Pollution

9204-276. Abbasi S A, Kunhahamed T, Madhavan K, Nipanay P C, Soni R (Cent Polln Contl Biowaste Energy, Pondicherry Univ, Pondicherry 605014). **Environmental management of chromium, copper and zinc with respect to impact on growth and germination of gram (Cicear ariatinium).** *J Inst Public Hlth Engrs, India*, **12** (1) (1992), 12-23 [23 Ref].

The studies on the impact of various levels of chromium, copper and zinc on the germination and growth of gram Cicerarietin are presented. The study reveals that chromium, copper and zinc are inhibitory to the germination and growth of gram specially at higher concentration. A comparison of permissible levels of chromium, copper and zinc in industrial wastewaters and irrigation waters with minimum toxic levels of these metals to gram revealed that in many cases the permissible levels are higher than the recommended levels for effluent disposal and irrigation purposes. The present study indicates the need for a thorough reevaluation of the present standards.

9204-277. Agarwal S X, Gupta Hemlata (P G Dept Bot, Govt Autonomous Coll, Kota). **Effect of nitrogenous fertilizerfactory effluents on 'seedling growth and biochemical characteristics of Brassica campestris and Cicerarietinum.** *Acta Ecologica*, **14** (1) (1992), 53-60 [26 Ref].

Germination energy index showed a gradual decline from 0.966 in control to 0.107 in 100% effluent treatment. In seedling growth the inhibitory effect was more on the radicle rather than that of hypocotyl. The effluent caused marked decrease in pigment concentration of seedlings, chlorophylla.

9204-278. Agarwal S K, Mathur Meera (Dept Bot, Govt Autonomous Coll, Kota). **Industrial air pollution induced macromorphological injury in avenue plants at Kota.** *Acta Ecologica*, **14** (1) (1992), 35-39 [12 Ref].

The occurrence of different types of foliar injury due to the structural and functional differences in the species studied. In the vicinity of the industries the leaf area

injury index was observed to be maximum in *Cassia fistula* (84.6). The injury index values showed gradual reduction in the 1.5 and 2 km zone from the industries.

9204-279. Bansal S K, Kaw J L (Dept Biochem, Vallabhbhai Patel Chest Inst, Univ of Delhi, Delhi 110007). **Influence of quartz dust on lactate production in peritoneal macrophages.** *J Environ Bio*, **13** (3) (1992), 175-179 [26 Ref].

Peritoneal macrophages and quartz dust interaction was studied in vitro. Quartz dust inhibited lactate production and the degree of inhibition was more in glucose free condition. There was no substantial uptake of glucose and the pyruvate was present in negligible amounts. Results suggest that quartz exerts its effect on metabolism at a point between protein catabolism and lactate production.

9204-280. Bhatia Indu, Choudhri G N (Cent Adv Std Bot Banaras Hindu Univ, Varanasi 221005). **Impact of automobile effusion on plant and soil.** *Int J Eco Environ Sci*, **17** (2) (1991), 121-127 [22 Ref].

A systematic analysis of soils sampled every month from sites on either side of roads with incidence of heavy, medium and infrequent automobile traffic, was done over one summer season. The study revealed a tendency of lead content in the soil to increase corresponding to the traffic volume and to decrease with distance from the road. The data show a high concentration of total metal in the surface soil than in its deeper layers.

9204-281. Chandra Prakash, Garg Poonam (Aquatic Botl Lab, Natl Botl Res Inst, Lucknow 226001). **Absorption and toxicity of chromium and cadmium in *Limnanthemum cristatum* Griseb.** *(The) Sci Total Envi*, **125** (1992) 175-183 [19 Ref].

Limnanthemum cristatum Griseb, grows commonly in closed water-bodies in India. Absorption of chromium and cadmium by this plant was determined in 3% Hoagland solution containing 0.05, 0.1, and 2.0 ppm of these two metals. Treated leaves showed highest accumulation of chromium at 2 ppm after 168 h, however, concentration was greater in the root (960 µg/g dry wt.) than the leaf (629 µg/g dry wt.). In cadmium highest accumulation for the same duration was recorded at 0.1 ppm both in root (520 µg/g dry wt.) and leaf (515 µg/g dry wt.). Cadmium was found to be more toxic than chromium.

9204-282. ChatterHemlata (Dept Bot, Coll Sci, Sukhadia Univ, Udaipur). **Effect of cement dust on growth performance of *Trigonella foenum graecum*, and the reversal of its inhibitory effect by different substance and growth rehalators.** *Acta Ecologica*, **13** (2) (1991), 103-108 [12 Ref].

The use of growth regulators in reverting the detrimental effects of cement dust pollution on crops has been recently tried in the laboratory. Methi (*Trigonella foenum graecum* Linn Var. Pusae early branch (grown in the botanical garden and the different concentration of GA and Kinetin in association with urea, phosphate and potassium nitrate were tried. Cement dust deposition was found to cause a significant reduction in all the parameters studied.

9204-283. ChatterHemlata (Dept Bot, Sukhadia Univ, Udaipur). **Effect of cement dust on the enzymatic activity in the leaves of *Triticum aestivum*.** *Acta Ecologica*, **13** (2) (1991), 113-119 [20 Ref].

Effect of cement dust on the activity of phosphatase (Acid and alkaline) and oxidase (Peroxidase) was estimated in the present communication in the crop *Triticum aestivum* at its different phenological stage. The activities of the three enzymes studied was observed to increase with the increase in the concentration of cement dust. The activity was highest in all the three enzymes at maturation and lowest in control one.

9204-284. Choudhary Anil, Mohan Davendra (Dept Zoo, Univ Jodhpur, Jodhpur 342001). **Distribution pattern of Zn, Cu, Pb and Cd in a few seasonal agricultural corps of Joghri river belt, Jodhpur.** *J Nature Conserv*, **4** (1) (1992), 41-44 [11 Ref].

Concentrations of Cu, Pb and Cd were estimated in a few agricultural crops of Joghri river belt. The accumulation pattern of metals in rain irrigated crop was Cu > Zn > Cd. In the mushroom plant, the accumulation of metals was maximum. Polluted well irrigated crops accumulated more metals than rain irrigated. Grains accumulated more metals than leafy tissue.

9204-285. Deka S, Devi A, Azad P (Inst Adv Std Sci Techno, Khanapara, Guwahati 781022). **Impact of crude oil on the growth of soil microorganisms in the rice field of Khanapara, Guwahati, Assam.** *J Indl Polln Contl*, **8** (1) (1992), 11-14 [9 Ref].

Investigations on the impact of different concentrations of crude oil treated soil on microflora (bacteria and fungi) after different periods of incubation was carried out. The concentrations of crude oil and periods of incubation have direct effect on growth and survival of microorganisms. The variation according to concentrations of crude oil exhibited variation in number of colonies.

9204-286. Dhindwal A S, Singh S, Tomar N K (Dept Soil Sci, Haryana Agricl Univ, Hisar 125004). **Growth and quality of wheat on polluted soil in relations to phosphorus and farm yield manure.** *Env Eco*, **10** (3) (1992), 602-607 [12 Ref].

A screen house experiment was conducted to evaluate the effect of P levels and FFM on growth parameters, yield and chemical composition of wheat in normal, naturally polluted and spiked soils. There was little or no increase in these parameters in polluted and spiked soils. The dry matter accumulation and leaf area was higher in normal soil at 30 days growth stage than in polluted and spiked soils; how ever, reverse was true at the later growth stages. The grain produced on spiked soil with and without P and on polluted soil without P was found unfit for human consumption as its metal content exceeded the recommended limit.

9204-287. Gupta Arun, Nathawat G S (Indira Gandhi Cent HEEPS, UnivRayasthans Jaipur). **Effect of textile effluent on germination and seedling growth of Pisum satiwn Var RPS3.** *Acta Ecologica*, **13** (2) (1992), 109-112 [8 Ref].

The effect of textile effluent on the germination and seedling growth of Pisum sativum Var RPG-3 were observed at different concentration of effluent which exerted toxic effect on seed germination and seedling growth. It was observed that with increasing concentration of effluent there was decrease in root and shoot length and total biomass. There was more adverse effect on root length as compared to shoot length.

9204-288. Jain P K, Chauhan S V S (Dept Bot, RBS Coll, Agra 282002). **Effect of SO₂ on in vitro pollen germination in some plants.** *Acta Ecol Rgica*, **13** (2) (1991), 78-81 [9 Ref].

Effect of SO₂ fumigation on in vitro pollen germination, the growth and time taken for germination was observed in *Coccinia indica*, *Impatiens balsamina*, *Lablab purpurcus* and *Parkinsonia aculeata*. Pollen grains lost their fertility and pollen tube formation and growth was considerably reduced by SO₂ in all the plants studied pollen of *Parkinsonia aculeata* was least effected.

9204-289. Joshi O P, Pawar K, Dubey B D (Bot Dept, PMB Gudarati Sci Coll, Indore, MP). **Dust pollution monitoring at Indore city using plants.** *Cheml Environ Res*, **1** (1) (1992), 53-57 [8 Ref].

Study deals with the nature of particulate matter collected from different polluted areas and dust trapping efficiency of some common plants. The leaf wash conductivity was higher during winter than in summer.

9204-290. Khan M Wadid, Khan Mujeebur Rahman, Khan Abrar A (Dept Bot, Aligarh Muslim Univ, Aligarh 202002). **Effect of air pollution cawed by ceramic and pottery industries in powdery mildew and root knot nematodes on cucurbits.** *J Indian Botl Soc*, **70** (1991), 373-378 [23 Ref].

The study considered the impact of air pollution caused by the ceramic and pottery industries of Khurja on powdery mildew and rootknot nematodes on cucurbits. The cucurbits cultivated in field plots on the right side of Khurj a Delhi Road in usual windward direction upto 4 km were surveyed for the study. Concentrations of pollutants present in the ambient air were not at the damaging levels. Physiochemical analysis of the soils also did not show appreciable changes due to the pollution.

9204-291. Khan Mujeebur Rahman, Khan M Wazid (Dept Bot, Aligarh Muslim Univ, Aligarh 202002). **Impact of air pollutants emanating from a thermal power plant on tomato.** *J Indian Botl*, **70** (1991), 239-244 [21 Ref].

An experiment was conducted to determine impact of air pollutants emanating from the Thermal Power Plant Kasimpur, Aligarh, on tomato plants grown in pots at two

polluted sites in wirednet houses K1 & K2) about 1, and 2 km away from the stack. Concentration of SO₂ and NO₂ was higher at K2 while SPM was greater at K. Similarly foliar deposition of particulates was greater at K1. Tomato plants grown at the polluted site produced foliar injury. Browning and chlorosis of the leaves were greater at K2. Plants exhibited suppressed growth, yield and leaf pigment content, being greater at K2.

9204-292. Khatik S K, Dikshit P R, Vishwakarma S K (Dept Soil Sci, J N Krishi Vishwa Vidyalaya, Jabalpur). **Direct and residual effect of oxalic acid industrial waste with rock phosphate and phosphorous levels on wheat and maize in chromustert soil.** *J Intl Polln Contl*, **8** (1) (1992), 15-20 [8 Ref].

Field and been house studies showed that application of increasing levels of waste material either alone or in combination with rock phosphate and phsophorus, significantly increased the grain and dry matter yields of wheat and mazze. Phosphorus and sulphur uptake were significantly influenced by progressive doses of the fertilizer in both the crops. No significant changes were observed by application of waste material on pH and electrical conductivity of soil.

9204-293. Lebel L Antoine, RamanuSam M P, Ambalanathan B (Dept Bot, Cent P G Sci, Pondicherry 605008). **Efficiancy of some roadside plants as dust filters.** *Geobios.* **19** (4) (1992), 143-146 [9 Ref].

Four common roadside plants, namely Azaduachta indica, Bougainvillea spectabilis, Nerium odommand Psicliumgucyava were tested for their dust gathering J capacity under natural pollution loads in five different roads of Pondicherry town. Dust analytical data and growth parameters indicate that N. odorum and P. guajava are the best dust gatherers.

9204-294. Panda Kamal K, Lenka Maheswar, Panda Brahma B (Genetic Toxic Lab, Dept Bot, Berhampur Univ, Berhampur 760007 Orissa). **Monitoring and assessment of mercury pollution in the vicinity of a chloralkali plant. II plant availability, tissue concentration and genotoxicity of mercury from agricultural soil contaminated with solid waste assessed in barley (Hordeum Vulgare L.).** *Environ Polln*, **76**(1) (1992), 33-42 [38 Ref].

Barely (*Hordeum vulgare* L.) was used to assess plant availability, tissue concentration and genotoxicity of mercury from the solid waste deposits of a chloralkali plant. The cytogenetic analysis revealed the effects of mercury on the mitotic and meiotic chromosomes which were significantly correlated with soil mercury. The bioconcentration of mercury in aerial tissues decreased with the age of the plant. Roots were found to concentrate most of the mercury taken in straw was at a minimum. The accumulation of mercury in grain, which was significant, did not increase with the increase in concentration of mercury in soil but maintained a plateau, indicating a restriction of transport of mercury through the phloem.

9204-295. Panigrahi N C, Mishra B B, Mohanty B K (PG Dept Bot, Khallikota Coll, Berhampur 760001). **Effect of sulphur dioxide on chlorophyll content of two crop plants.** *Environ Bio*, **13** (3) (1992), 201-206 [15 Ref].

Two crop plants, rice (*Oryza sativa* L.) CV, Jajati, and mung (*Phaseolus aureus* R.) CV Dhauri, were fumigated with different concentrations (0.252.00 ppm) of sulphur dioxide for different periods at various stages of growth (age) and the chlorophyll content was observed. Low level of SO₂ fumigation for shorter exposure period reduced the chlorophyll content only by 20-40%, whereas it was drastically reduced in high concentrations of sulphur dioxide for a longer period (48 h).

9204-296. Patil Bharati D, Patil Dnyan N, Gunale Venkat R (Dept Bot, Sch Environ Sci, Univ Poona, Pune 411007). **Lead in roadway dust and roadside plants.: a case study of the metropol of Pune, Maharashtra, India.** *Biologia Indica*, **1** (2) (1992). 43-48 [15 Ref] [Late Pub].

Studies on the concentration of lead in roadway dust and roadside plants from the Metropolis of Pune, Maharashtra, have shown that the enrichment of dust and plants with lead is closely related to the density of vehicular traffic. The areas with higher density of vehicular traffic have shown higher concentrations of lead in the roadway dust during both the premonsoon and postmonsoon seasons.

9204-297. Rao M V, Dubey P S (Sch Std Bot, Vikram Univ, Ujjain 456010). **Occurrence of heavy metals in air and their accumulation by tropical plants growing around an industrial area.** *Chem Sci Total Env*, **126** (1 & 2) (1992) 1-16 [21 Ref].

This study deals with the chemical nature of airborne particles and their accumulation in certain tropical plants growing around an industrial area. Particles of > 10.9, 1.65.4 and <0.7 mm were significantly more abundant than those of 0.71.6 and 5.410.9 mm at all the polluted sites. The concentrations of chromium, copper iron and lead are high in particles of <10.9 and <0.7 mm; while manganese and mercury were abundant in 5.410.9 and 0.71.6 mm sized particles and nickel was high in < 0.7 and 0.781.6 mm particles.

9204-298. Salgare S A, Swain Sabita (Dept Bot, Inst Sci, Bombay 400032). **Effect of auto exhaust pollution at western express highway near National Park, Borivli (East) on the micromorphology of some weeds (I harvesr)l.** *Biosphere*, **3** (1) (1991), 8-18 [9 Ref].

The effect of autoexhaust pollution at western express highway near National Park, Borivli (East), on the micromorphology of *Cassiatora*, *Xanthium strumarium* and *malachra capitata*, was studied under parameters like number of stomata and epidermal cells per unit area, stomatal index, length, breadth, calculated area and l/b ratio of stomata from upper and lower surfaces of the 5th leaf. The parameters such as number of stomata and epidermal cells per unit area and stomatal index exhibited stimulation whereas length, breadth showed inhibition.

9209-299. Sharma C P, Sharma Vivek (Dept Bot, Coll Sci, Sukhadia Univ, Udaipur). **Effect of cement dust pollution on enzyme activity in some tree species growing around Associated Cement Companies Ltd. Lakheri.** *Acta Ecologica*, **13** (2) (1991), 99-102 [8 Ref].

Attempt is made to observe the effect of cement dust on activity of enzymes like acid and alkaline phosphatase in the leaf samples of the four tree species viz. *Albtzia lebbeck*, *Bauhinfa varaiegata*, *FYous religfosa* and *Pongamda pinnata* grown around by Associated Cement Companies Ltd, Lakheri. Observations have suggested that the activity of these enzymes increases in response to cement dust deposition.

9204-300. Sharma Tirthesh Kumar, Prakash Govind (Eco physis Lab, Dept Bot, Meerut Unilr, Meerut 250004). **Effects of SO₂ on *Lycopersicon esculentum*.** *J Indian Botl Soc*, **70** (1991), 201-205 [16 Ref].

The effects of SO₂ of concentration of 320,667 and 1334 mg m³ have been studied on length of root, shoot and internodes, number of leaves, branches and nodes, leaf area, per cent foliar injury, fresh and dry weight fractions, phytomass and net primary productivity, chlorophylls, ascorbic acid and sulphur content in *Lycopersicon esculentum*. Significant reduction was observed in all growth parameters, Chlorophyll and ascorbic acid were also reduced significantly.

9204-301. Srivastava H S (Dept Plant Sci, Rohilkhand Univ, Bareilly 243001). **Nitrogenous pollutants in the atmosphere: their assimilation and phyto-toxicity,** *Curr Sci.* **63** (6) (1992), 310-316 [98 Ref].

Most plants possess well characterized physiological and biochemical systems to absorb nitrogenous gases from the atmosphere and to assimilate the nitrogen into organic nitrogenous compounds. The exposure to these gases at relatively higher concentrations results in some physiological and morphological aberrations in plants. Apparently, there are some unknown constraints on the optimum utilization of nitrogenous gases as sources of nutrient nitrogen, which are perhaps linked to their phytotoxic reactions.

9204-302. Sujatha R, Krishnaswamy R, Subburum V (Dept Environ Sci, Bharathiyar Univ, Coimbatore 641046). **Toxicity to selected dyes to *Vigna radiata* (L.) Wilezek.** *Geobios*, **19** (2 & 3) (1992), 81-87 [10 Ref].

The textile dyes, Navy blue M3R and Direct brown 2G, not only reduced the percentage of seed germination in *Vigna radiata* (L) Wilezek, but also suppressed the various morphological, biochemical and physiological parameters more adversely than Direct brown 2G.

9204-303. Tripathi B D, Tripathi Anamika (Polln Eco Res Lab, Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Foliar injury and leaf diffusive resistance of rice and white bean in response to SO₂ and O₃, simply and in combination.** *Environ Polln*, **75** (3) (1992), 265-268 [17 Ref].

Plants of rice (*Oryza sativica*) and white bean (*Phaseolus vulgaris*) were exposed to 524 Wg m³ SO₂, 392µgm⁻³, O₃ and mixture of both gases, i.e.52411g m⁻³ SO₂ and 392 Rg m³ O₃ to determine the visible foliar injury and leaf diffusive resistance. Response of leaf diffusive resistance was measured on upper and lower surfaces of leaves. Thus, SO₂ alone is know to decrease, and O₃ tends to increase leaf diffusive resistance. However, exposure to both gases increases or decreases the resistance, depending on the species response.