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AIR POLLUTION : PROBLEMS AND PERSPECTIVES

During recent years, attention has been drawn to the complexity of problems of air pollution in large urban centers. Though information is available on many atmospheric contaminants, a number of these contaminants are still unknown. All the activities of a man, the biological processes of living matter and natural phenomena on the earth result in continuous emission of gases, vapours, dust and aerosols to the atmosphere. Studies on the nature, properties and behaviour of these substances are the challenges to the scientists dealing with various aspects of air pollution.

The major air pollutants are from emissions due to the use of fossil fuels. In addition, the emissions from industrial production processes and the large scale use of many industrial products like fertilizers, solvents, pesticides, *etc.* may be the dominating sources in some areas.

Whatever gaseous exchange takes place in the lower atmospheric region (upto 40,000 feet above the earth surface) is essentially concerned with the air pollution problems. The average composition of lower atmosphere for those natural constituents that may be regarded as occurring more or less constant are oxygen (20.94%), nitrogen (78.09%), carbon dioxide (0.03%), water vapour, ozone, argon, krypton, and other gases. In addition, there are other variable gaseous constituents of natural origin *eg.* oxides of nitrogen from electrical discharge during storms, sulphur dioxide, hydrogen fluoride and hydrogen chloride from volcanic disturbances, hydrogen sulphide from seepage of sour natural gas from volcanoes or from the action of sulphide bacteria and ozone formed photochemically. Dust and aerosols of natural origin present in the atmosphere consists of salt particles from sea water, various types of condensation nuclei, air-borne particles from coal and vegetation, dust of meteorite origin, bacterial spores, pollen, *etc.*

Pollutants in the Air

A chemical other than those conventionally accepted in the composition of clean air is called a "contaminant". A contaminant that can cause an adverse effect to a receptor and which occurs in the atmosphere in sufficiently high concentrations to cause an adverse effect is called a "pollutant".

A large number of substances can contaminate the air. Many of these substances are released on a small scale, as a result of particular industrial processes. The atmospheric pollutants, that cause most concern, are those emitted in large quantities, especially as a result of fuel combustion. These are mainly carbon dioxide, carbon monoxide, hydrocarbons, oxides of nitrogen, oxides of sulphur and particulates (including various metals). It is known that fuel combustion in the stationary sources contributed the most of the sulphur oxides and a substantial proportion of particulates and oxides of nitrogen, while motor vehicles are the main source of hydrocarbons and carbon monoxide.

One of the most important factors responsible for air pollution is the ground level concentration of pollutants.

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These ground level concentrations are the ultimate results of various atmospheric dispersions under prevailing meteorological conditions. Air pollution causes many effects some of which are immediate and obvious. Nearly all these effects could result in chronic degradation of man and his resources under specific conditions. The general areas into which air pollution effects can be classified are effects on man and other animals; effects on vegetation; effects on material; and effects on climate at the regional and global levels.

The effects on vegetation, material and climate are beyond the scope of this article and are not considered here. Several environmental health issues that are related to a comprehensive assessment of health effects of air pollution, *eg.* exposure to tobacco smoke, indoor air pollutants and occupational exposure are also being not considered here.

Implications of Air Pollutants on Human Health

Three lines of evidence are applicable to a consideration of human health effects of air pollutants. These include data derived from animal experiments, from practical experimental human exposure and from epidemiologic studies of exposed human population both in the community and the work place.

Adverse health effects have been associated with three major types of air pollution related to three major source categories:

(i) The sulphur dioxide and particulate complex arising from the combustion of sulphur containing fossil fuels, particularly in fossil fuel power plants.

(ii) Photochemical oxidants formed in the atmosphere from a complex chemical reaction between hydrocarbons and oxides of nitrogen and carbon monoxide, both of which are largely related to automobile emissions.

(iii) A miscellaneous class of air pollutants such as arsenic, asbestos, beryllium, cadmium, hydrogen sulphide, lead and mercury which are mostly emitted by localized point sources such as smelters, refineries and manufacturing plants.

Nine general categories of adverse health effects have been related to human exposure to different air pollutants. These include air pollution associated mortality; chronic respiratory disease morbidity; exacerbation of disease in chronically ill person; acute respiratory disease morbidity; effects on ventilatory function; cancer of the lungs; heart diseases; sensory, neurological and behavioural effects; and effects from persistent metals and other pollutant residues.

Air pollution and associated mortality

Historically the most clear evidence for an association between SO_x/particulates air pollution and death was showed by a number of acute air pollution episodes during which meteorological conditions caused several days of air stagnation and increased atmospheric concentration of pollutants. The best known of these episodes are those which occurred in the Meuse Valley of Belgium in 1930[1], in Donora, Pennsylvania in 1948[2], in London in 1952[3] and in New York City in 1953[4]. These air pollution episodes drew the attention of the medical community to the public health consequences of uncontrolled air pollution. The observed relationship of SO_x/particulates air pollution episodes to excess mortality led investigators to examine the possible association of air pollution of lesser magnitude with variations in daily mortality[5-14].

Studies on SO_x/particulates type of pollution from various parts of the world in different years imply a relatively consistent association between long-term residence in more polluted communities and increased mortality rates. Population mobility tends to decrease the likelihood of finding the effects of air pollution. There may be some correlation between the proportion of the population involved in high risk occupation and residing in areas of heavy pollution. Therefore, the consistency of the air pollution/mortality associations does not imply causality due to several intervening factors.

Air pollution and chronic respiratory morbidity

Identifying the contribution of air pollution to the development of chronic obstructive respiratory diseases introduces difficulties in isolating the effects from other contributing factors. Most studies of chronic respiratory disease and air pollution have indicated a relationship between the prevalence of chronic respiratory symptoms and SO_x/particulate complex[15-25]. Interpretations of an observed associations between air pollution exposure and prevalence of respiratory disease are often complicated by many potentially confounding factors like smoking, socio-economic characteristics, occupational exposure, migration of populations into or out of polluted areas, *etc.* When adjustments are made for potential confounders, the

association of respiratory disease prevalence with air pollution often becomes considerably weak and it is difficult to determine whether the effect is really quite small or whether the effects were over adjusted for some of the confounding factors. The role of confounding factors become larger when attempt is made to determine lowest concentrations at which air pollution contributes to the risks.

Air pollution and exacerbation of disease in chronically ill person

An extensive series of studies on the effects of air pollution on bronchitic patients attending chest clinics was conducted by Lawther *et al*[26], which show that exacerbations of disease were associated with high concentrations of smoke and suiphur dioxide. Further examination of sickness absence records, rates of physicians consultation and daily records of hospital admissions through the emergency service showed associations with periods of heavy air pollution[5,27-31].

Study of the effect of air pollution on persons with chronic respiratory disease is particularly important from a public health point of view because these persons are believed to include a segment of population, extremely susceptible to air pollution exposure. Air quality standards based on protection of public health should be established to provide adequate protection for these susceptible groups. Many investigators have studied the temporal pattern of symptoms status in these persons in relation to concentrations of air pollutants and weather factors[7,32].

Air pollution and acute respiratory disease

An experimental basis for a relationship between air pollution and impaired resistance to respiratory infections has been established in laboratory animals. Mice infected with respiratory pathogens and exposed to SO_x[33], ozone[34] and urban air pollution[35] have shown increased mortality and decreased resistance to infection compared to infected but unexposed animals. Similarly, several epidemiological studies have observed an increased incidence of respiratory illness in populations living in localities with more SO_x/particulate pollution[36-38].

These studies support an association between increased acute lower respiratory tract disease (acute bronchitis, pneumonia and other acute chest illness) in adults and residence in more polluted localities. However, the pollutants or concentrations in the presence of which increased risk of acute illness occurs, have not been established and it is difficult due to many environmental and personal factors, to implicate a specific concentration that contributes to a population risk of acute respiratory illness.

Air pollution and ventilatory function

In the studies reported from England, Japan, USA, Canada and Denmark, geographic differences in various air pollution indices have been related to ventilatory function in school children [32,39-43]. Ventilatory function in children is a useful measure of air pollution effects, because cigarette smoking, occupational exposure and changes of residence do not generally play a role in the observed effects. Children residing in more polluted areas show diminished ventilatory function when compared with their counterparts living in less polluted areas.

Slightly diminished lung function may not be important, but when other respiratory challenges such as frequent infections, cigarette smoking, air pollution and occupational exposure are added, respiratory health may be seriously compromised. Burrows *et al*[44] observed close relationship between a history of childhood respiratory disorders and prevalence of symptoms, obstructive airway diseases, and ventilatory impairment in adults. They have also noted that even young adults with relatively mild ventilatory impairment and a history of paediatric respiratory illness show a steeper declining slope in function with age and cigarette smoking than the adults without impairment or history of illness. The fact that air pollution exposure increases the risk of diminished lung function and acute respiratory illness in childhood also suggests an increased risk for subsequent development of obstructive lung disease in adulthood[45]. Long-term prospective studies, beginning in childhood, are therefore, required to provide definite evidence for these possible relationships. Experimental human exposures are particularly useful in determining the precise concentrations of specific pollutants at which airways of healthy adults can be affected. Experimental studies on healthy human volunteers are very valuable in identifying physiological responses to precisely known pollutant concentrations and in establishing dose response relationships. However, experimental studies may not adequately represent the real atmosphere with its complex and dynamic mixture of air pollutants.

Air pollution and cancer of the lung

The hypothesis that air pollution may be a factor in human lung cancer derives from three types of studies *viz.* (i) comparison of lung cancer rates in immigrants from one country to another with the rates of native born non-immigrants in both countries[46]; (ii) investigation of urban and rural differences in lung cancer risk[47]; and (iii) qualitative and quantitative differences in air pollution by area and associated lung cancer rates[47-49].

The suspicion that air pollution leads to lung cancer remains neither proved nor disproved. The overwhelming influence of cigarette smoking, the contribution of occupational exposures, the scarcity of good measurements of potential atmospheric carcinogens and the long latent period between first exposure and detection of cancer, all contribute to the difficulty of obtaining evidence for the relationship between air pollution and lung cancer.

Air pollution and heart disease

Cigarettes, diet, lack of exercise, high blood pressure and increased serum lipid concentrations have received the most attention as the environmental risk factors that contribute to heart disease. Evidence that air pollution, particularly carbon monoxide increases heart disease risk also exist[50-51]. Although there are many uncertainties in these findings, their significance is considerably enhanced by studies on individuals with angina pectoris exposed to CO on freeways[52] or experimentally[53,54]. The experimental studies show that persons with angina experience chest pain significantly earlier during exercise when carboxyhaemoglobin concentrations reach 2.5 to 3.0 per cent.

Several other reports suggest a relationship between exposure to ozone and damage to myocardial fibres[55], between exposure to sulphur dioxide and cardiovascular deaths[56] and between sulphate concentrations and exacerbation of disease in elderly persons with heart diseases[57]. Large concentrations of cadmium in air have been correlated with death rates due to cardiovascular diseases[58].

Air pollution and sensory irritation, central nervous system function and human performance

The odour of some air-borne substances and irritation to the eyes, nose and throat are the most common and annoying aspects of air pollution. Perception of these effects is very real, but quantifying them is difficult[59].

Most odourous materials, except for hydrogen sulphide, are difficult to measure at concentrations that are perceived as objectionable. Odour annoyance survey methods[60] are appropriate ways of monitoring for odour and estimating the severity of impact.

Hydrogen sulphide is a common and offensively odourous material, readily perceived by its rotten egg odour. It originates from kraft paper mills, industrial waste disposal ponds, sewage treatment plants, tanneries, coke oven plants and geothermal wells. At higher concentrations, hydrogen sulphide may impair the sense of smell and produce unconsciousness.

Aldehydes produced by incomplete combustion of fossil fuels are irritating to the skin and eyes. Formaldehyde is one of the more common aldehydes that irritate the eyes, nose and other portions of the respiratory tract[61].

Ozone, the major component of photochemical smog, directly irritates the pharynx and trachea, causing a burning sensation in the upper part of the chest. Japanese investigators[62,63] have described eye irritation, chest discomfort, headache, and various other symptoms in school children playing outdoor on "smog alert" days in various cities in Japan.

Carbon monoxide can alter human performance as well as cardiac function. At small concentrations, effects on various measures of performance, such as time interval discrimination and ability to concentrate, decrements in vigilance tasks and in visual threshold have been reported in experimentally exposed subjects[64-66]. Apparently the effect of CO can be overcome by sustained interest in the task. However, when subjects are required to perform tedious and monotonous tasks, carbon monoxide can impair performance.

Inhalation of significant amounts of air-borne lead can cause neurologic disturbances and even adversely affect the central nervous system. Children living near a lead smelter were shown to have altered nerve conductance velocities[67].

It is apparent that these air pollutants can impair sensory organs and human performances. Some of these

effects are easily perceived, others are difficult to demonstrate. The long-term health implications of this category of effects are not adequately known.

Air pollution and effects from persistent metals and other chemicals

Certain trace metals, various synthetic chlorinated hydrocarbons and polychlorinated biphenyls accumulate in the body. The accumulation of these substances in the body is a cause for concern. In the case of synthetic hydrocarbons, little is known about the long-term health consequences of increased tissue concentrations, however, based on animal studies there is suspicion that some of these compounds are carcinogenic[68]. Considerably more is known about the toxic effects of increased tissue concentrations of lead, cadmium and arsenic[69,70]. Air pollution is an important contributor to tissue concentrations of these substances and may increase the risk of toxic effects when other environmental exposure are added. It is necessary to use animal toxicity data for trace metals, in formulating guidelines for protection of public health.

The National Air Pollution Scenario

The Air (Prevention and control of pollution) Act 1981 and the Environment Act 1986 form the basis for monitoring and controlling air pollution in the country especially after the Bhopal gas tragedy in 1984. However, even before the promulgation of these Acts, several attempts were made to monitor the air quality with specific objectives from time to time. Data on air quality were available upto 1980 only for the three metropolitan cities of Bombay, Calcutta and Delhi under WHO/GEMS programme operated by National Environmental Engineering Research Institute (NEERI), Nagpur[71,72]. A study conducted by the GEMS network on the global distribution of particulate pollution over the period of 1980-84 observed that the daily mean concentration of particulates in New Delhi exceeded the WHO standards of 230 $\mu g/m^3$ on 294 days during the year[73].

Six of the ten largest cities in India *viz.* Bombay, Calcutta, Delhi, Ahmedabad, Kanpur and Nagpur, have severe air pollution problems with the annual levels of total suspended particles (TSPs) at least three times as high as the WHO standards. Over 80 per cent of the National Ambient Air Quality Monitoring (NAAQM) stations, for which annual mean concentrations are reported by the Central Pollution Control Board, showed particulates exceeding 75 $\mu g/m^3$. In contrast, the annual average concentrations of SO_2 and NO_x were lower in relation to the respective air quality standards. There does not apear to be any clear correlation between a city's population and air pollution. Many medium sized cities have air pollution levels higher than several megacities[74]. The critical analysis of the air quality data of nine urban centres in India from 1978-81 by Chatterjee *et al*[75] revealed that if the TSPs are not taken into consideration, the gaseous pollutants generated by industries and by motor vehicles together failed to produce any significant levels of pollution in any of the nine urban areas. The significance of particulates in urban areas in India is not clear since air in the rural environments also contain almost equally high concentrations of TSPs[74]. Only a small undetermined proportion of TSPs in urban air is anthropogenic[75].

Until recently the air quality data in India had been traditionally collected in the form of TSPs which is of limited value from the heatlh poiont of view. Recent studies have indicated that particulate matter having $\leq 10\ \mu$ diameter (PM_{10}) could provide a better index of health risks[13,29]. Hence more data on PM_{10} should be generated using sophisticated instruments.

A few systematic studies on the air pollution and its effects on human beings have been reported for urban centres like Bombay[76], Ahmedabad[77,78], Bangalore[79] and Vadodara[80]. The blood lead levels of persons in some cities (Ahmedabad, Bangalore and Calcutta) of the country that still use leaded gasoline, on an average, were higher compared to countries using lead free gasoline[81].

The most recent World Bank estimates for air pollution/health risks for 36 cities in India indicated that there could be over 40, 000 premature deaths, with 7,500 (19%) in Delhi, 5,700 (14%) in Calcutta and 4,500 (11%) in Bombay, due to exposure to the current air pollution levels in these cities. These premature deaths could have been avoided if the air pollution levels in these cities were brought down to the WHO standards[82].

These studies have shown the qualitative effects of air pollution especially on high risk population groups. Recently studies on air pollution and its impact on residents of certain critically polluted identified areas of the country have been concluded by the Ministry of Environment & Forests, Government of India. The results of these studies would provide a better understanding of air pollution/health risks relationship based on Indian experiences.

Not many studies have been undertaken till recently in the field of biological air pollution or of the potential biohazards such as bio-allergens. Biological contaminants of air include fungi, viruses, bacteria, insects, vegetable dust, pollen grains, *etc.* Indian studies on bio-allergens have been restricted to only a few towns and cities like Aurangabad, Jaipur, Calcutta, Delhi, Bangalore, Gulbarga, Gwalior and Imphal[83-89]. Studies on bio-allergens will be an important aspect of air pollution in addition to routine chemical analysis.

Conclusions

Animal experiments, experimental human exposure studies and studies on populations exposed to air pollution have provided qualitative and quantitative understanding of the health effects of community air pollution.

The issues involved in evaluation of air pollution/ health risks are complex and difficult. Existing knowledge of air pollution/health damage relationships can be improved, extended and tested against new data. Simplifying assumptions can be made more realistic and other factors that modify the effects of air pollution can be evaluated. Progress in our understanding of the effects of air pollution on the full range of biological response in human beings, and measurement of population exposure will be required to resolve the issues satisfactorily.

References

1. Firket, J. The cause of the symptoms found in Meuse Valley during the fog of December 1930. *Bull R Acad Med 11:* 683, 1931.
2. Schrenk, H.H., Heimann, H., Clayton, G.D., Gafafer, W. and Wexter, H. Air pollution in Donora, Pennsylvania. Epidemiology of unusual smog episodes of October 1948. Public Health Bulletin. 306, U.S. Government Printing Office, Washington DC. 1949.
3. Ministry of Health. Mortality and morbidity during the London fog of December 1952. Report on Public and Medical Subjects No.95. Her Majesty's Stationery Office, London, 1954.
4. Greenberg, L., Jacobs, M.B., Drolette, B.M., Field, F. and Braverman, M.M. Report of an air pollution incident in New York city, November 1953. *Public Health Rep 77:* 7, 1962.
5. Martin, A.E. Mortality and morbidity statistics and air pollution. *Proc R Soc Med 57:* 969, 1964.
6. Buechley, R.W., Riggan, W.B., Hasselbald, V. and Van Bruggen, J.B. SO_2 levels and perturbations in mortality. A study in the New York, New Jersey Metropolis. *Arch Environ Health 27:* 134, 1973.
7. Lebowitz, M.D. A comparative analysis of the stimulus-response relationship between mortality and air pollution-weather. *Environ Res 6:* 106, 1973.
8. Lebowitz, M.D., Toyama, T. and Mc Carroll, J. The relationship between air pollution and weather as stimuli and daily mortality as responses in Tokyo. Japan, with comparison with other cities. *Environ Res 6:* 327, 1973.
9. Schimmel, H. and Murawski, T.J. SO_2 harmful pollutant or air quality indicator? *J Air Pollut Control Assoc 25:* 739, 1973.
10. Schwartz, J. and Marcus, A. Mortality and air pollution in London, a time series analysis. *Am J Epidemiol 131:* 185, 1990.
11. Schwartz, J. and Dockery, D.W. Particulate air pollution and daily mortality in Steubenville, Ohio. *Am J Epidemiol 135:* 12, 1992.
12. Schwartz, J. and Dockery, D.W. Increased mortality in Philadelphia associated with daily air pollution concentrations. *Am Rev Respir Dis 145:* 600, 1992.
13. Pope, C.A. III, Schwartz, J. and Ransom, M.R. Daily mortality and PM_{10} pollution in Utah Valley. *Arch Environ Health 47:* 211, 1992.
14. Saldiva, P.H.N., Pope, C.A. III, Schwartz, J. Dockery, D.W., Lichtenfels, A.J., Salge, I.M., Barone, I. and Bohn, G.M. Air pollution and mortality in elderly people : A time series study in Sao Paulo, Brazil. *Arch Environ Health 50:* 159, 1995.
15. Petrilli, F.L., Agnese, G. and Kantiz, S. Epidemiologic studies of air pollution effects in Genoa, Italy. *Arch Environ Health 12:* 733, 1966.
16. Yashizo, T. Air pollution and chronic bronchitis. *Osaka Univ Med J 20:* 10, 1968.
17. Bates, D.V. The fate of the chronic bronchitis : A report of the ten year follow up in the Canadian Department of Veteran's Affairs Coordinated Study of Chronic Bronchitis. *Am Rev Respir Dis 108:* 1043, 1973.
18. Chapman, R.S., Shy, C.M., Finklea, J.F., House, DE., Goldberg, H.E. and Hayes, C.G. Chronic respiratory disease in military inductees and parents of school children. *Arch Environ Health 27:* 138, 1973.
19. Hrubec, Z., Cedulof, R., Friber, L. and Harton, R. Respiratory symptoms in twins : Effects of residence associated air pollution, tobacco and alcohol use and other factors. *Arch Environ Health 27:* 189, 1973.
20. Ferris, B.G., Chen, H., Puleo, S. and Murphy, R.L.H. Jr. Chronic non-specific disease in Berlin. New Hampshire, 1967-1973. A further follow up study. *Am Rev Respir Dis 113:* 475, 1976.
21. *Chronic Non-Specific Respiratory Disease in the City of Cracow.* Report of a 5 year follow up study among adult inhabitants of the city of Cracow. Eds. F. Sawicki and P.S. Lawrence. National Institute of Hygiene, Warsaw, 1977.
22. Hodgkin, J.E., Abbey, D.E., Euler, G.L. and Magie, A.R. Comparison of chronic obstructive pulmonary disease prevalence in non-smokers in high and low photochemical air pollution areas. *Chest 86:* 830, 1984.

23. Euler, G.L., Abbey, D.E., Hodgkin, J.E. and Magie, A.R. Chronic obstructive pulmonary disease symptom effects of long-term cumulative exposure to ambient levels of total suspended particulates and sulphur dioxide in California Seventh-Day Adventist residents. *Arch Environ Health 42:* 213, 1987.

24. Abbey, D.E., Petersen, F.F., Mills, P.K. and Kittle, L. Chronic respiratory disease associated with long-term ambient concentrations of sulphates and other pollutants. *J Exp Anal Environ Epidemiol 3 (S1):* 99, 1993.

25. Abbey D.E., Hwang, B.L., Burchette, R.J., Vancuren, T. and Mills, P.K. Estimated long-term ambient concentrations of PM_{10} and development of respiratory symptoms in non-smoking population. *Arch Environ Health 50*: 139, 1995.

26. Lawther, P.J., Waller, R.E. and Henderson, M. Air pollution and exacerbation of bronchitis. *Thorax 25:* 525, 1970.

27. Carne, S. Air pollution study. *Proc R Soc Med 57:* 620, 1964.

28. Gregory, J. The influence of climate and atmospheric pollution on exacerbation of chronic bronchitis. *Atmos Environ 4:* 453, 1970.

29. Pope, C.A. Respiratory hospital admissions associated with PM_{10} pollution in Utah, Salt Lake and Cache Valleyes. *Arch Environ Health 46:* 90, 1991.

30. White, M.C., Etzel, R.A., Wilcox, W.D. and Llyod, C. Exacerbation of childhood asthma and ozone pollution in Atlanta. *Environ Res 65:* 56, 1994

31. Stieb, D.M., Burnett, R.J., Beveridge, R.C. and Brook, J.R. Association between ozone and asthma emergency department visits in Saint John, New Brunswick, Canada. *Environ Health Prespect 104:* 1354, 1996.

32. Mosechalm, L., Taudori, E. and Frosig, A. Pulmonary function changes in asthmatics associated with low level of SO_2 and NO_2 air pollution, weather and medicine intake. *Allergy 48:* 334, 1993.

33. Fairchild G.A., Roan, J. and McCarrol, J. Atmospheric pollutants and the pathogenesis of viral respiratory infection. Sulphur dioxide and influenza infection in mice. *Arch Environ Health 25:* 174, 1972.

34. Coffin, D.L. and Gardner, D.E. Interaction of biologic agents and chemical air pollutants. *Ann Occup Hyg 15:* 219, 1972.

35. Saldiva, P.H.N., King, M., Delmonte, V.L.C. Machione, M., Parada, M.A.C., Daliberto, M.L., Sakne, R.S., Criado, P.M.P., Silveira, P.L.P., Zin, W.A. and Bohn, G.M. Respiratory alterations due to urban air pollution : An experimental study in rats. *Environ Res 57:* 19, 1992.

36. Verma, M.P., Schilling, F.J. and Becker, W.H. Epidemiological study of illness absences in relation to air pollution. *Arch Environ Health 18:* 536, 1969.

37. Lebowitz, M.D., Cassell, E.J. and Mc Carroll, J.D. Health and the urban environment : XV. Acute respiratory episodes as reactions by sensitive individuals to air pollution and weather. *Environ Res 5:* 135, 1972.

38. Levy, D., Gent, M. and Newhouse, M.T. Relationship between acute resiratory illness and air pollution levels in an industrial city. *Am Rev Respir Dis 116.* 167, 1977.

39. Biersteker K. and van Leeuwen,P. Air pollution and peak flow rates of school children. *Arch Environ Health 20:* 382, 1970.

40. Feriss, B.G. Effects of air pollution on school absences and difference in lung function in first and second graders in Berlin, New Hampshire. January 1966 to June 1967. *Am Rev Respir Dis 102:* 591, 1970.

41. Shy, C.M., Hasselblad, V., Burton, R.M., Nelson, C.J. and Cohen, A.A. Air pollution effects on ventilatory function of US School children. Results of studies in Cincinnati, Chattanooga and New York. *Arch Environ Health 27:* 124, 1973.

42. Chapman, R.S., Hasselblad, V., Hayes, C.G., Williams, J.V.R. and Hammer, D.I. Air pollution and childhood ventilatory function. I. Exposure to particulate matter in two south eastern cities. 1971, 1972. In: *Clinical Implications of Air Pollution Research.* Eds. A.J. Finkel and W.C. Duel. Publishing Science Group. Inc. Acton, Mass, p.285, 1976.

43. Keiding, L.M., Rindel, A.K. and Kronbarg, D. Respiratory illnesses in children and air pollution in Copenhagen. *Arch Environ Health 50:* 200, 1995.

44. Burrows, B., Knudson R.J. and Lebowitz, M. The relationship of childhood respiratory illness to adult obstructive air way disease. *Am Rev Respir Dis 115:* 751, 1977.

45. Reid, D.D. The beginnings of bronchitis. *Proc R Soc Med 62:* 311, 1969.

46. Reid, D.D., Cornfield, J., Markash, R.E. *et al.* Studies of disease among migrants and native population in Great Britain, Norway and the United States.III. Prevalence of cardio-respiratory symptoms among migrants and native born in the United States. *Natl Cancer Inst Monogr 19:* 321, 1966.

47. Hammond, E.C. Smoking habits and air pollution in relation to lung cancer. In: *Environmental Factors in Respiratory Disease.* Ed. D.H.K. Lee. Academic Press, New York, p.177, 1972.

48. Carnow, B.W. and Meier, P. Air pollution and pulmonary cancer. *Arch Environ Health 27:* 207, 1973.

49. Menck, H.R., Casagrande, J.T. and Henderson, B.E. Industrial air pollution : Possible effects on lung cancer. *Science 183:* 210, 1974.

50. Cohen, S.I., Deane, M. and Goldsmith, J.R. Carbon monoxide and survival from myocardial infarction. *Arch Environ Health 19:* 510, 1969.

51. Hexter, A.C. and Goldsmith, J.R. Carbon monoxide : Association of community air pollution with mortality. *Science 172:* 265, 1971.

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52. Aronow, W.S., Harris, C.N., Isbell, M.W., Rokow, S.N. and Imparato, P. Effect of freeway travel on angina pectoris. *Ann Intern Med 77:* 669, 1972.

53. Aronow, W.S. and Isbell, M.W. Carbon monoxide effect on exercise induced angina pectoris. *Ann Intern Med 79:* 392, 1973.

54. Anderson, E.W., Andelman, R.J., Strauch, J.M., Fortuin, N.J. and Knelson, J.H. Effect of low level carbon monoxide exposure on onset and duration of angina pectoris. A study in ten patients with ischaemic heart disease. *Ann Intern Med 79:* 46, 1973.

55. Brinkman, R., Lambents, H.B. and Venirga, T.S. Radiometric toxicity of ozonised air. *Lancet i:* 133, 1974.

56. Carnow BW. Sulphur oxides and particulates : Effects on health. In: *Proceedings of the National Academic of Science Conference on Health Effects of Air Pollution.* US Government Printing Office, Washington DC Stock No. 5270-02105, p.263, 1973.

57. Goldberg, H.E. *et. al.* Frequency and severity of cardiopulmonary symptoms in adults panels : 1970/71, New York, studies in health consequences of sulphur dioxide : A report from CHESS, EPA 65011-74.004. US Government Printing Office, Washington DC 1974.

58. Carroll, R.E. The relationship of cadmium in the air to cardiovascular disease death rates. *JAMA 198:* 267, 1966.

59. Henkin, R.J. Effects of vapor phase pollutants on nervous system and sensory function. In: *Clinical Implication of Air Pollution Research.* Eds. A.K. Finkel and W.C. Duel. Publishing Science Group Inc. Acton. Mass, p.193, 1976.

60. Karolinska Institute : Methods for measuring and evaluating odorous air pollutants at the source and in the ambient air. *Report on the International Symposium in Stockholm.* June 1-5, Department of Environmental Hygiene, Stockholm, 1970.

61. Brabec, M.J. Aldehydes and acetals. In: *Patty's Industrial Hygiene and Toxicology.* Third Edition (Vol. IIA). Eds. G.D. Clayton and F.E. Clayton. John Willey and Sons, New York. p.2629, 1981.

62. Schimizu, T. Classification of subjective symptoms of junior high school students affected by photochemical air pollution. *J Jpn Soc Air Pollut 9:* 734, 1975.

63. Makino, K. and Mizoguchi, I. Symptoms caused by photochemical smog. *Jpn J Public Health 22:* 421, 1975.

64. Halperin, M.H., Mc Farland, R.A., Niren, J.I. and Roughton, F.J.W. The time course of the effects of carbon monoxide on visual threshold. *J Physiol 146:* 583, 1959.

65. Howarth, S.M., Dahms, T.E. and O'Hanlon, J.F. Carbon monoxide and human vigillance. A deleterious effect of present urban concentration. *Arch Environ Health 23:* 342, 1971.

66. Fodor, G.G. and Winneke, G. Effect of low CO concentrations on resistance to monotony and on psychomotor capacity (English ed.) *Staub Reinhat Luft, 32:* 46, 1972.

67. Landrigen, P.T., Baker, E.L. Jr., Fieldman, R.G., Cox, D.H., Eden, R.V., Ornstein, W.A., Mathew, J.A., Jankel, A.J. and von Lindern, I.H. Increased lead absorption with anaemia and slower nerve conductance in children near a lead smelter. *J Pediatr 89:* 904, 1976.

68. Innes, J.R.M., Ulland, B.M., Valrio, M.G., Petrucell, L., Fishbein, L., Hart, E.R., Pallota, A.J., Bates, R.R., Falk, H.L., Gart, J.J., Klein, M., Mitchell, I. and Peters, J. Bioassay of pesticides and industrial chemical for tumorigenicity in mice. A preliminary note. *J Natl Cancer Inst 42:* 1101, 1969.

69. *Metallic Contaminants and Human Health.* Ed. D.H.K., Lee. Academic Press. New York, 1972.

70. *Handbook on Toxicology of Metals.* Vol. II. *Specific Metals.* Eds. L. Friberg, G.F. Nordberg and V.D.Vouk. Elsevier Science Publishers BV, New York, 1986.

71. *Urban Air Pollution. 1973-1980.* Global Environmental Monitoring Systems. WHO, Geneva, 1984.

72. Sundaresan, B.B., Pamptiwar, V.L. and Aggrawal, A.L. Air quality in selected cities in India. National Environmental Engineering Research Institute, Nagpur, 1983.

73. French, H. Cleaning the air : A global agenda. Worldwatch paper 94. Worldwatch Institute, Washington, D.C., 1990.

74. Central Pollution Control Board : *National Ambient Air Quality Statistics of India 1991.* National Ambient Air Quality Monitoring Series, New Delhi, 1992.

75. Chatterjee, B.B., Patel, T.S. and Raiyani, C.V. Analysis of characteristics of urban air pollution over a four year period 1978-81. *Indian J Public Health 29:* 226, 1985.

76. Kamat, S.R., Godkhindi, K.D., Shah, B.W., Mehta, A.K., Shah, V.N., Gregrat, J., Papewar, V.N., Tyagi, N.K., Rashid, S.A., Bhiwankar, N.T. and Natu, R.B. Correlation of health morbidity to air pollutant levels in Bombay city. Results of prospective 3 year survey at one year. *J Postgrad Med 26:* 45, 1980.

77. Aggrawal, A.L., Patel, T.S., Raiyani, C.V., Patel, P.D., Dewan, A., Mohan Rao, N. and Chatterjee SK. Ahmedabad autoexhaust pollution survey and its effects on exposed occuptional groups. Monograph I.National Institute of Occupational Health, Ahmedabad, 1979.

78. Patel, T.S., Raiyani, C.V. and Kulkarni, P.K. Comparative epidemiological studies on effects of air pollutants. In: *Annual Report, 1984-85.* National Institute of Occupational Health, Ahmedabad, p.B1

79. Rajmohan, H.R., Rajan, B.K., Krishnamurthy, V., Shanmukappa, D.R., Ramaswami, T.P. and Nagarajan, L. Air Pollution Study in Bangalore City - 1981. In: *Annual Report, 1984-85.* National Institute of Occupational Health, Regional Occupational Health Centre (Southern), p.24.

80. Patel, T.S., Patel, P.D., and Kashyap, S.K. *A Report on Integrated Air Quality Surveillance Study Over Vadodara Urban Development Area.* National Institute of Occupational Health, Ahmedabad, 1989.

81. WHO/UNEP : *Assessment of Human Exposure to Lead and Cadmium through Biological Monitoring.* Ed. M. Vahter. WHO, Department of Environmental Hygiene, Karolinska Institute, Stockholm, 1982.

82. Brandon, C. and Hammann, K. *The Cost of Inaction : Valuing the Economy - Wide Cost of Environmental Degradation in India.* Executive summery report. Asia Environment Division, World Bank 1995.

83. Shivpuri, D.N. Comparative evaluation of the sensitivity of common methods of diagnostic antigen tests in patients of respiratory allergy. *Indian J Chest Dis 4:* 102, 1962.

84. Shivpuri, D.N. Studies in allergy to fungi in India. *Aspects Allergy Appl Immunol 15:* 19, 1982.

85. Agashe, S.N., Nagalakshamma, K.V., Chatterjee, M. and Anand, P. Aeromycoflora of Bangalore (A preliminary study). *Aspects Allergy Appl Immunol 16:* 49, 1983.

86. Agashe, S.N., Anand, P., Manjunath, K. and Abraham, J.N. Airborne pollen survey of Bangalore (A preliminary study). *Aspects Allergy Appl Immunol 16:* 53, 1983.

87. Mari Bhat, M. and Rajasab, A.H. Incidence of air-borne pollen at two different locations in Gulbarga during 1984-85. *Indian J Med Res 82:* 346, 1985.

88. Datta, T.R. and Jain, A.K. Certain biocomponents in the air of an industrial area at Gwalior. *Indian J Aerobial 3:* 45, 1990.

89. Singh, N.I. and Devi, K.K. Aerobiology and allergic human diseases in Manipur. II. Air-borne pollen grains of Imphal. *Indian J Aerobiol 5 (Special Issue):* 49, 1992.

This write-up has been contributed by Dr. T.S. Patel, Assistant Director, National Institute of Occupational Health, Ahmedabad.

ICMR NEWS

The following meetings of various technical committees/groups of the Council were held:

Meetings of the Task Force (TF)/Project Advisory Committee (PAC) held at New Delhi:

Steering Committee of the TF on the monitoring of adverse drug reactions in India	May 20, 1997
PAC on Quality of Community Life	June 5, 1997

Participation of ICMR Scientists in Scientific Events:

Dr. S.K. Kar, Director, Rajendra Memorial Research Institute of Medical Sciences, Patna, participated in the meeting of the WHO South-East Asia Regional Task Force on Kala-azar at Patna (May 19-20, 1997).

Dr. Kamala Gopalakrishnan, Dy. Director and Dr. K.V. Rani Reddy, Senior Research Officer, Institute for Research in Reproduction, Mumbai, participated in the VI International Congress of Andrology at Salzburg, Austria (May 25-29, 1997).

Dr. J.M. Deshpande, Director, Enterovirus Research Centre, Mumbai, paticipated in the IV meeting of the WHO South-East Asia Regional EPI Technical Consultative Group on Vaccine Preventable Diseases at New Delhi (May 29 - June 2, 1997).

Dr. Bhanu Iyengar, Director, Institute of Pathology, New Delhi, participated in the IV World Conference on Melanoma and XIX World Congress of Dermatology at Sydney (June 10-14 and 15-20, 1997 respectively).

Workshop:

ICMR organized a national workshop on sharpening of tools for improving the quality and coverage of reproductive and child health services in the national programme, at New Delhi (June 10-12, 1997).

*** *** ***

Dr. K. Banerjee, relinquished charge as Director of the National Institute of Virology, Pune w.e.f. May 31, 1997.

INDIAN COUNCIL OF MEDICAL RESEARCH

AWARDS AND PRIZES 1996

The Indian Council of Medical Research invites nominations/applications from Indian scientists for its various prizes and awards in the field of biomedical sciences. Details of the awards/prizes , as also the format for application may be seen in the following pages. They may also be obtained from the Director-General, Indian Council of Medical Research, (Indo-Foreign Cell), Post Box No. 4911, Ansari Nagar, New Delhi-110029.

Nominations/completed applications should reach this office on or before **30th September, 1997**.

DETAILED INFORMATION

1. Basanti Devi Amir Chand Prize (Value : Rs.5,000)

This prize will be awarded annually to a senior research worker of more than ten years standing for work of outstanding merit in any subject in the field of biomedical science, including clinical research. The term "Clinical Research" implies research into the mechanism and causation of disease, including its prevention and cure. The criteria for award of the prize are the significance and value of addition to existing knowledge contributed by a worker in a particular field in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

The selection for this prize is made one year in advance.

2. Dr.P.N.Raju Oration Award (Value : Rs.5,000)

This prize will be awarded in alternate years, to an eminent scientist, preferably a medical person, for his/her work in any subject of national importance in the field of medicine or public health. The subject for this award for 1996 is **Research in Orthopaedics.**

3. Sandoz Oration Award for Research in Cancer (Value : Rs.2,500)

This prize (and a medal) will be awarded in alternate years, to an eminent scientist for outstanding work carried out on a particular aspect of **Cancer**. The eminence is to be judged on the basis of his/her contributions to cancer research which should have been recognised nationally and internationally and helped towards control, prevention and cure of cancer.

4. Dr.Y.S.Narayana Rao Oration Award in Microbiology (Value : Rs.4,000)

This prize will be given in alternate years, to an eminent scientist for outstanding work carried out in the field of **Microbiology.** The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in **Microbiology** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

*5. Chaturvedi Kalawati Jagmohan Das Memorial Award (Value : Rs.2,000)

This prize (and a gold medal) will be awarded once in three years, to an eminent scientist, preferably a medical person, for his/her work in the field of **Cardiovascular Diseases**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in **Cardiovascular Diseases** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

*** This Prize/Award is *not* being awarded for the year 1996.**

6. Dr.Kamala Menon Medical Research Award (Value : Rs.5,000)

This prize will be awarded to an eminent scientist, preferably a medical person, for outstanding contribution made in the fieldS of **Internal Medicine** and **Paediatrics** in alternate years. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on a subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research. The subject for the 1996 award is **Internal Medicine**.

7. Kshanika Oration Award to a Woman Scientist for Research in the field of Biomedical Sciences (Value : Rs.5,000)

This prize will be given annually to an eminent woman scientist for outstanding work carried out in any branch of biomedical science, contributing to the alleviation of human suffering. The criterion for award of this prize is the significance and value of addition to existing knowledge contributed by her in any field of biomedical sciences in which she has been actively engaged over a number of years and has shown sustained activity in research.

8. Dr.M.K.Seshadri Prize in the field of Practice of Community Medicine (Value : Rs.10,000)

This prize (and a gold medal) will be awarded in alternate years, to an eminent scientist or institution whose original work has led to useful inventions in or otherwise significantly contributed to the practice of **Community Medicine**.

9. M.N.Sen Oration Award for Practice of Medicine (Value : Rs.5,000)

This prize will be given once in three years, to an eminent scientist for outstanding work carried out in the field of practice of medicine **(Clinical, Laboratory or Therapeutic)**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker to the practice of medicine in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

10. JALMA Trust Fund Oration Award in the field of Leprosy (Value : Rs.5,000)

This prize (and a medal) will be given annually to an eminent scientist for outstanding research in the field of **Leprosy**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on any aspect of leprosy in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

11. Dr.J.B.Srivastav Oration Award in the field of Virology (Value : Rs.10,000)

This prize will be given in alternate years, to an eminent scientist for outstanding work carried out in the field of **Virology**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in **Virology** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

12. ICMR Prize for Biomedical Research for Scientists belonging to Under-privileged Communities (Value : Rs.10,000)

This prize will be given annually to an eminent scientist for his/her outstanding contributions in any field of Biomedical Sciences. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in the particular field in which he/she has been actively engaged over a number of years and has shown sustained activity in research. This prize will be awarded to **scientists belonging to under-privileged communities**.

13. ICMR Prize for Biomedical Research conducted in Under-developed Areas (Value : Rs.10,000)

This prize will be awarded annually to an eminent scientist for his/her outstanding contributions in any field of Biomedical Sciences. The criterion for award of the prize is the significance and value of biomedical research carried out by a **worker based in under-developed parts of the country, or for work carried out in under-developed parts of the country over a period of five years preceding the year** for which the award is to be given.

14. BGRC Silver Jubilee Oration Award (Value :Rs.5,000)

This prize will be given in alternate years, to an eminent scientist for outstanding work carried out in the field of **Haematology/Immunohaematology**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in this speciality in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

***15. Smt.Swaran Kanta Dingley Oration Award (Value : Rs.10,000)**

This prize will be given in alternate years, to an eminent scientist for outstanding contribution in the field of **Reproductive Biology**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in the field of **Reproductive Biology** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

16. Dr.M.O.T.Iyengar Memorial Award (Value : Rs.4,000)

This prize will be given annually to an eminent scientist for outstanding contribution in the fields of **Malaria, Filariasis, Plague or Medical Entomology**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in any of the fields of **Malaria, Filariasis, Plague or Medical Entomology** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

17. Prof.B.K.Aikat Oration Award (Value : Rs.3,000)

This prize will be given in alternate years, to an eminent scientist for outstanding work carried out in the field of **Tropical Diseases**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in **Tropical Diseases** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

18. Dr.Vidya Sagar Award (Value : Rs.5,000)

This prize will be awarded in alternate years, to an eminent scientist for outstanding contributions made in the field of **Mental Health**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in **Mental Health** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

19. Amrut Mody-Unichem Prize (Value : Rs.10,000)

This prize will be given to an eminent scientist for outstanding work carried out in the field of **Cardiology & Neurology, and Gastroenterology** (in alternate years). The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on a subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research. The subject for the 1996 award is **Cardiology & Neurology.**

*** This Prize/Award is *not* being awarded for the year 1996.**

20. Amrut Mody-Unichem Prize (Value : Rs.10,000)

This prize will be given to an eminent scientist for outstanding work carried out in the field of **Maternal & Child Health, and Chest Diseases** (in alternate years). The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on the subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research. The subject for the 1996 award is **Chest Diseases**.

21. Chaturvedi Ghanshyam Das Jaigopal Memorial Award (Value : Rs.3,000)

This prize will be given in alternate years, to an eminent scientist for outstanding work carried out in the field of **Immunology**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on the subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

22. Lala Ram Chand Kandhari Award (Value : Rs.5,000)

This award will be given in alternate years, to an eminent scientist for outstanding research in the fields of **Dermatology and Sexually Transmitted Diseases**. The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker on the subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

***23. Dr.Prem Nath Wahi Award for Cytology and Preventive Oncology (Value : Rs.20,000)**

This award will be given in alternate years, to an eminent scientist for outstanding contribution in the field of **Basic and/or Clinical Cytology, and/or Preventive Oncology**. The criterion for award is the significance and value of addition to existing knowledge contributed by a worker on the subject in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

***24. Dr.D.N.Prasad Memorial Oration Award (Value : Rs.20,000)**

This award (and a medal) will be given in alternate years, to an Indian scientist for significant contribution to research in the field of **Pharmacology**, carried out in India, as evidenced by research papers and innovations. The criteria for award will be the significance and value of addition to existing knowledge in research in **pharmacology**.

25. Prof.Surindar Mohan Marwah Award (Value : Rs.25,000)

This award will be given once in two years to an Indian scientist for significant contribution in the field of **Geriatrics**, through sustained research in India on the problems of the aged as evidenced by research papers in science publications. The subject matter could be biomedical or psychosocial research on problems of the aged, both basic and applied.

Prize/Award for scientists above 45 years of age on January 1st of the year for which the award is to be given

26. Smt.Pushpa Sriramachari Award (Value : Rs.5,000)

This prize (and a silver medal) will be given in alternate years, to individuals for outstanding contribution to research on **Pathology and Pathophysiology - Clinical or Experimental**. The individual should be an established scientist above the age of 45 years and should have made a comprehensive and significant original contribution in unravelling the understanding and the nature, evolution or prevention of any human disease entity.

*** This Prize/Award is *not* being awarded for the year 1996.**

Prizes/Awards for young scientists below 40 years of age on January 1st of the year for which these awards are being given

27. Shakuntala Amir Chand Prizes (Four in Number of value : Rs.1,500 each) :

These four prizes will be awarded annually to the **best published research** work in any subject in the field of biomedical science including clinical research. The term 'Clinical Research' covers research into the mechanism and causation of disease and its prevention and cure, and includes work on patients in hospitals, field studies in epidemiology and social medicine, and observations in general practice.

Both medical as well as non-medical graduates are eligible for award of the prize. The prizes are awarded to Indian nationals for work done in any institution in India. **Work started in India but completed abroad will not be acceptable.**

Papers published in Indian or Foreign Journals in the previous two years will be considered for award of these prizes in the current year.

28. Raja Ravi Sher Singh of Kalsia Memorial Cancer Research Award (Value : Rs.2,000)

This prize will be awarded in alternate years, to a scientist for outstanding work done in the **experimental or clinical aspects of cancer or in the organisation and conduct of any service or service-cum-research programme in cancer prevention and treatment.** For the prize to be awarded in the current year the work carried out in the previous year will be considered.

***29. Dr.V.N.Patwardhan Prize in Nutritional Sciences (Value : Rs.7,000)**

This prize will be given in alternate years, to an eminent scientist, for outstanding work carried out in India on **Fundamental, Clinical or Field Studies in Nutritional Sciences.** The criterion for award of prize is the contribution of a worker to **Nutritional Sciences** in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

30. Tilak Venkoba Rao Award (Value : Rs.1,000)

This prize will be given to an eminent scientist for research in the field of **Psychological Medicine** and **Reproductive Physiology** respectively in alternate years. The criterion for the award is the significance of contribution to existing knowledge by a worker who has been actively engaged in research on the subject over a number of years. The subject for the 1996 award is **Psychological Medicine.**

31. Dr.T.Ramachandra Rao Award (Value : Rs.3,000)

This prize will be given in alternate years, to a scientist for his/her outstanding contribution made in the field of **Medical Entomology.** The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in this speciality in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

32. Dr.C.G.S.Iyer Oration Award (Value : Rs.1,500)

This prize will be given in alternate years, to a scientist for his/her outstanding contribution made in the field of **Leprosy.** The criterion for award of the prize is the significance and value of addition to existing knowledge contributed by a worker in this speciality in which he/she has been actively engaged over a number of years and has shown sustained activity in research.

*** This Prize/Award is *not* being awarded for the year 1996.**

33. Dr.Dharamvir Datta Memorial Oration Award (Value : Rs.3,000)

This award will be given in alternate years, to a scientist (Medical or Non-medical) for work carried out in the last 5 years in India in the field of **Liver Diseases**. The criteria include significance and value of addition to existing knowledge contributed by a worker in this speciality, with special reference to application of findings to **Clinical Hepatology**.

34. Prof.B.C.Srivastava Foundation Award (Value : Rs.5,000)

This award will be given in alternate years, to a scientist for work in the field of **Community Medicine** in medical colleges/recognised institutions. The criterion for the award is the significance of research contributions to the practice of **Community Medicine** by a worker.

35. Smt. Kamal Satbir Award (Value : Rs.5,000)

This award will be given annually to individuals for outstanding contribution to research on **Non-tuberculous Chest Diseases, especially Respiratory Allergy and Chronic Obstructive Lung Diseases**, pertaining to mechanism and causation of the diseases, their prevention and/or management.

The work to be assessed would be the research carried out in India and published in scientific journals during the three years preceding the year for which the award is to be given.

36. Major General Saheb Singh Sokhey Award (Value : Rs.10,000)

This award will be given annually to a scientist for his/her outstanding contribution in the field of **Communicable Diseases** depending upon its significance and value in terms of addition to existing knowledge contributed by the worker in that field. The facets of work to be considered could be basic or applied research which add to the knowledge on the mechanism and causation of communicable diseases, their prevention and/or their management. The work to be assessed would be the research carried out in India and published in scientific journals, during the 3 years preceding the year for which the award is to be given.

37. Dr.H.B.Dingley Memorial Award (Value : Rs.5,000)

This award will be given annually to individuals for outstanding contribution to research in the field of **Paediatrics** by Indian scientists. The work to be assessed would be research work carried out in India and published in scientific journals during the 3 years preceding the year for which the award is to be given.

*Dr. B.R.Ambedkar Centenary Award for Excellence in Biomedical Research (Value : Rs.1.00 lakh)

Dr. B.R. Ambedkar Centenary Award for excellence in biomedical research was instituted in the year 1991-92 as part of the Dr. Ambedkar Birth Centenary Celebrations. The award, of value Rupees one lakh, is to be awarded in alternate years, for excellence in any field of biomedical research, as evidenced by scientific publications in internationally recognised journals, and contribution to advancement of knowledge and/or improvements in medical practices, health programmes, *etc*. This Award is open to all age groups.

Direct applications are not accepted for this Award. Only nominations by certain categories of people will be considered. Details are available in a separate brochure, which are available on request.

*** This Prize/Award is *not* being awarded for the year 1996.**

HOW TO APPLY

Applications/nominations should provide the names and other particulars of the candidates for award of the prizes to the Council in the prescribed proforma.

Five copies (**Ten copies** in the case of the **Basanti Devi Amir Chand Prize**) of each of the following documents will have to be sent with the application:-

1. The proforma for application/nomination with the details duly completed.
2. A note giving full details of the outstanding research contribution of the nominee or applicant which makes him/her worthy of the award.
3. A short biographical sketch of the candidate.
4. A list of papers published by the candidate giving details of those published in Indian and Foreign Journals separately, and also indicating whether the journals are indexed or not.
5. Five reprints each of five recent significant papers published on the subject of the award by the applicant/nominee (for the **Basanti Devi Amir Chand Prize, ten reprints** of each paper are required).

The applications for **Shakuntala Amir Chand Prize** should be sent along with **ten copies each** of the following documents.

1. The proforma for application/nomination with the details duly completed.
2. Reprints of the papers submitted for the prize.
3. A note giving details of research work done by the candidate.
4. A list of papers published giving details of those published in Indian and Foreign Journals separately, and also indicating whether the journals are indexed or not.
5. A short biographical sketch of the candidate.

Nomination for Dr.B.R.Ambedkar Centenary Award for Excellence in Bio-Medical Research should be in the separate format prescribed. Direct applications will not be entertained for this Award. It may, however, be noted that this Award is not on offer for 1996.

TERMS & CONDITIONS OF ICMR AWARDS/PRIZES

1. Only work published in Scientific (scholarly) Journals will be considered for ICMR Awards.
2. Normally work done during the preceding five years on the subject will be considered (except where otherwise indicated, under "Detailed information on the ICMR prizes/awards".
3. If a scientist has received an ICMR award for a particular subject, the same material will *not* be considered for another ICMR award or the same award in a subsequent year, unless there is evidence that additional work have been done. As such, those applicants/nominees who have received an ICMR award previously, should clearly indicate the additional work done by them and substantiate the same with reprints of subsequent publications.
4. Only applications/nominations which are complete in all respects will be considered. **Five sets of documents (10 in case of Basanti Devi and Shakuntala Amir Chand Prizes) should be submitted, each set containing one copy of the documents indicated in the Section "How to Apply".** If sets received are not complete, the application/nomination will not be considered.
5. Applicants/Nominees need not provide "No Objection Certificates" from co-authors (since 1990 onwards). **However, in the event of any dispute, the onus will be on the applicant/nominee/recipient of an ICMR Award or Prize, and ICMR will not be responsible for any such dispute arising out of counter claims.**
6. The nominations/applications complete in all respects and with all the required documents should reach the Council not later than **30th September,1997,** for ICMR Awards/Prizes for the year 1996.

JOINT APPLICATIONS

In the case of joint applications/publications, the prizes shall be divided between the applicants/authors in such proportion as the Selection Board may decide. The role of the individual who applies for the prize should be clearly indicated so as to make it easy to determine whether major part of the work has been done by that person. A certificate from the senior author that the candidate applying for the award has himself/herself made significant contribution to the research work for which his/her paper is being recommended for the award should also be submitted along with the application.

FORMAT FOR FURNISHING RELEVANT INFORMATION ABOUT THE NOMINEE/APPLICANT

Name of Award Applied for _____

1. Name of the Nominee/Applicant:
2. Date of birth and age as on 1st January of the year for which the award is being given
3. Academic qualifications beginning with the Bachelor's degree
4. Present employment and posts held previously
5. Details of outstanding research achievements during the last five years
6. Whether the achievements have been recognised/awarded by any learned Society/Institution
7. Number of scientific papers published, and reprints of those papers to be considered for the present application
8. Subject of research work presented for the award
9. Whether you have received earlier any award for the same work or paper. If so:(i) Name (ii) Year (iii) Value of award and (iv) Exact caption of work for which the Prize was awarded
10. Give names and designations of all the joint authors, if any, on the work/paper(s) submitted for the award
11. State whether for the same work/paper(s) any of the joint authors have received any award. If so, give the names of all the authors, the name of the prize awarded, year of award and its value
12. If you are a joint author, state precisely what has been your individual contribution to the work
13. State whether you have applied for any other award for the same or any other work. If so, state the name of the award and the subject of work submitted for the award
14. (i) List of papers, if any, submitted earlier for any other award and
    (ii) List of papers published subsequently and now submitted for consideration of the award:
15. Address for correspondence:(Please also give telephone, fax and e-mail numbers)

NOTE: Applicants for the the ICMR Prize for Biomedical Research for scientists belonging to Underprivileged Communities should provide attested Caste/Community Certificates.

COUNCIL'S TRAINING PROGRAMMES FOR 1997-98

Leprosy

At the Central JALMA Institute for Leprosy, Agra:

- Training Course on National Leprosy Eradication Programme for Medical Officers (September 15-26, 1997).

Virology

At the National Institute of Virology, Pune:

- Diploma in Medical Virology (June 1997-May 1998)

Reproductive Biology

At the Institute for Research in Reproduction, Mumbai:

- Workshop on Genotoxicity (August 18-29, 1997).
- Workshop on Basic Molecular Biology for Clinicians (December 2-11, 1997).

Endocrinology

At the National Institute of Nutrition, Hyderabad:

- Annual Certificate Course on Endocrinological Techniques and their Applications (August 1-September 15, 1997).

Nutrition

At the National Institute of Nutrition, Hyderabad:

- M.Sc. in Applied Nutrition (June 1, 1997-February 28, 1998).
- Postgraduate Certificate Course in Nutrition (December 1, 1997-February 28, 1998).

Occupational Health

At the National Institute of Occupational Health, Ahmedabad:

- Orientation Course on Occupational Health for Industrial Medical Officers (September 30-October 11, 1997).
- Training Course on Environmental Hygiene Practice (November 10-14, 1997).

Laboratory Animal Technology

At the National Centre for Laboratory Animal Science, National Institute of Nutrition, Hyderabad:

- Training Course for Laboratory Animal Technicians (June 16-July 31, 1997).
- Training Course for Laboratory Animal Supervisors (September 1-November 29, 1997).

Haematology

At the Institute of Immunohaematology, Mumbai:

- Training Course in Transfusion Medicine for Blood Bank Medical Officers (August 27-October 24, 1997).
- Training Course in Blood Group Serology and Blood Bank Methodology for Blood Bank Technicians (August 27-September 26, 1997).
- Training Course in Advanced Haematology and Immunohaematology (October 6-24, 1997).

ERRATUM

Dr.A. Gajanana, Dy. Director, Centre for Research in Medical Entomology, Madurai, did not participate in the IV International Symposium on Dengue Fever at Tahiti (April 14-17, 1997) as reported in the April 1997 issue (Vol.27, page 41) under the column ICMR News.

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