

is less than the average for the country as a whole. Thus an index of 0.80 indicates an incidence 80% of the United States average, and an index of 1.20 indicates an incidence of 120% of the average. In studying Manos' data a series of cities with an index higher than normal, or representing a spread from less than normal to higher than normal, can be selected. Presumably, then, these can be related to some "index" of air pollution, be it by benzpyrene, ozone, hydrocarbons, or whatnot. However, indices reported by Gilliam (12) for many of the same cities do not coincide; thus, cities with high indices for lung cancer on Manos' list, may have normal or low indices on Gilliam's list. This then presents to the investigator the quandary as to which index to use in any air pollution correlation studies. In an attempt to resolve this, I corresponded with both Manos and Gilliam. The result was further confusion, when Gilliam (13) indicated that probably neither index was correct. This then throws considerable doubt on any conclusions drawn concerning the correlation between air pollution and lung cancer or any other disease.

Finally, although this review is confined almost entirely to data for human beings, one piece of animal data is worthy of mention. Mari-Chanez (14), a director of the Cancer Research Laboratories in Peru, compared the incidence of pulmonary tumors in Strain A mice kept at 14,900 ft. with those kept at sea level. The incidence in the former was 61.4% and in the latter, 53.0%, which the author did not believe statistically significant for the numbers of animals used (386). However, the animals kept at high altitudes developed more tumors greater than 4 mm. in size than those kept at sea level. It should be remembered that Strain A mice are being widely used to test the "tumorigenicity" or "carcinogenicity" of air pollutants. If such nonspecific effects as altitude can affect the incidence or size of such tumors, then it is not surprising that very high levels of "air pollutants," such as are used by experimentalists, might have a similar nonspecific effect.

CHRONIC LUNG DISEASE

Gocke and Duffy (15), of the Seton Hall Medical School, found a striking correlation between smoking and chronic bronchitis. Just as in lung cancer, the association between chronic lung disease and smoking seems far stronger than any association between chronic lung disease and air pollution. These observations have been confirmed by Schoettlin (16) in Los Angeles. In a study of 3000 elderly males, he found a higher prevalence of chronic respiratory disease in certain selected occupations and in those who had smoked more than 10 years. When matched for age and smoking, no significant correlations could be made between measures of weather, air pollution, and pollen, and observations of symptoms, physical signs, or pulmonary function in men with chronic respiratory disease and in controls. Again, this suggests that smoking is a far more important factor than air pollution.

Brinkman and Coates (17) studied the influence on bronchitis of increasing age, dust exposure, and cigarette smoking in 1317 men, aged 40-65. They found that smoking appeared to be the most aggravating factor.

Another study which has received much attention is that of Prindle *et al.* (18). In this, the pulmonary function of residents of two cities in Pennsylvania, Seward and New Florence, was studied. The cities, separated by a few miles, had a large power plant between them. The prevailing wind was such that one town was polluted with the effluent of the power plant, while the other was not. It was found that statistically significant differences in average height between the residents of the two cities were of a sufficient magnitude that average airway resistance could be affected. Since airway resistance was one of the measures of pulmonary function that showed differences between the two towns, it is not certain whether these differences were due to the air pollution or to this height difference. At present, height differences are not receiving the emphasis that they should, although the airway resistance differences are being suggested as resulting from the air pollution.

In a later report of this data by Prindle *et al.* (19), the authors state:

"After adjustments are made for age and height in comparing the two communities, results for both sexes in New Florence in relation to both in Seward reveal a surprising similarity. This is evident for each pulmonary function measurement except for Average Airway Resistance and Airway Resistance $\times$ Volume. These were higher for Seward than for New Florence. The dif-