

stems from the complex nature of the pollution insult. Air pollution involves a complex and constantly changing mixture of gaseous, liquid, and solid chemical compounds resulting in an infinite number of dosage patterns. In addition, the physical association of these mixtures is a complex, confusing, and little understood phenomenon that is probably directly related to the insult on the biological system. There is still much to be learned concerning the physical nature of pollutant mixtures to help clarify the nature of the biological effect; this will be discussed in more detail later. Medical research cannot wait for this clarification, however, and studies are under way even though the exposure system is not clearly defined. The best examples are studies of the synergistic or potentiating effects of aerosol-gas systems, which to date have involved mainly sulfur dioxide as the gaseous component, and the use of realistic multicomponent exposure systems.

In addition to the complexity in composition of the pollutant, other non-air pollution factors may be of major contributing importance in chronic or infectious illness stemming from pollution of the air. Consequently, much emphasis is being given to studies involving pollutants plus infectious agents and the interaction of pollutants and weather factors. The effects of meteorology (biometeorology) and of socio-economic factors further complicate the exposure pattern of pollution insults.

Lastly, air pollution medical research will be hard put to keep up with the investigations of all the combinations of pollutant mixtures that may be significant in the development of chronic disease. Hence, it would be of significant benefit if adequate screening techniques could be developed to point the way for more extensive medical investigations. A case in point is the present attempt to use microbiological systems (paramedica) as indicators of the potential car-

cinogenicity of fractions of organic material extracted from the suspended particulate of community atmospheres. This project is of particular interest, in that the chemical nature of the fractions is for the most part unknown. Information uncovered via the biological indicator-animal experimentation route can be used to point up the need for chemical identification of the specific compounds in the fraction, tracing them back to their sources in the community for possible control. Only a few per cent of the organic fraction of atmospheric pollution have been identified and quantified, so that any leads to candidate materials of suspected health significance are welcome.

#### Air Quality Criteria

The last item we will briefly discuss under the medical-biological areas of air pollution research is the development of air quality criteria. It is discussed here principally because man is the air pollution receptor of primary concern. The determination of air quality criteria will be greatly assisted by medical-biological investigations, both laboratory and epidemiological, directly related to man or in connection with systems that can be more or less extrapolated to man. This by no means signifies that the physical sciences, engineering investigations, and sociological studies in air pollution are not concerned with air quality criteria. Rather, the situation should be viewed as an ecological system with man's health as the principal focus of attention. The urgent need for cleaning the air sufficiently to assure only minimal effects on man's health can no longer be denied. This goal automatically demands a sequence of knowledge of what levels of pollutants are consonant with such minimal effects; what is the status of man's air environment; where these pollutants come from, and how these