Infectious disease is obviously one of the main factors limiting size of population, and indeed may be the controlling factor in areas where the food supplies are above the critical minimum. The various infections can usually be eliminated at very small cost, but the people who have been thus saved from dying will need food, clothing, homes, and work, which may not be available if there are too many of them. In many parts of the world today it is argued, "Why should a baby be saved from some infection soon after birth only to die of hunger 10 years later?" This kind of question determines the low priorities given to health programs in many countries and is reflected in much of the thinking of those allocating U.S. funds for assistance to foreign countries. The counterargument is that we cannot let die millions of people who could be saved at little expense, that progress at such a price is too expensive.

This is truly one of the great dilemmas of our time.

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Cigarettes: Polonium-210

Radford and Hunt's report [*Science* **143**, 247 (1964)] that polonium-210 in cigarette smoke may be a significant factor in the genesis of bronchial cancer in smokers is a distinct contribution to this controversial subject. However, their conclusion that no significance can be attached to differences between filter and nonfilter cigarettes is open to question. Their data showed that filter cigarettes yield 28 percent less polonium in the mainstream smoke (that part of the smoke which goes into the smoker's mouth) than nonfilter cigarettes, but they explained away this difference as not being related to the action of the cigarette filters. However, it may be more than a coincidence that the yield of smoke particles from such cigarettes was found to be in a similar ratio by Consumers Union [*Consumer Reports* **26**, 207 (1961)]: filter cigarettes yielded 31 percent less smoke particles (by weight) than nonfilter cigarettes. The connection between the cigarette filters and the lower yields of both tar and polonium is supported by Radford and Hunt's own statements that (i) polonium is adsorbed on smoke particles and (ii) their smoke-collection filters collected both the smoke particles and the adsorbed polonium. Why should the cigarette filters act any differently from their collection filters, except for differences in efficiency?

The close agreement between the Radford and Hunt polonium data and the Consumers Union tar data may be fortuitous; a better comparison would have been afforded if Radford and Hunt had given the mainstream smoke yields for each brand they tested.

One might argue that the 28-percent reduction, even if actually due to the cigarette filters, is too small to show that cigarette filters may have value in reducing the hazards facing smokers. Such a conclusion is not warranted from the Radford and Hunt data, which compared only two filter cigarettes with two nonfilter cigarettes. Consumers Union's 1961 tests revealed that some king-size filter cigarettes yield as much as 70 percent less tars than several other popular brands. One newly introduced cigarette seems to afford a reduction of 85 percent on this basis. If the polonium-210 yields are similarly reduced, one might conclude that cigarette filters *can* effect a significant reduction in hazard. A large segment of the population will go on smoking no matter how much proof of hazard is presented. Many of these people would smoke less-hazardous cigarettes if they knew which these were. They should not be told on the basis of inadequate evidence that there are no differences among cigarettes when there may, in fact, be large differences. More testing to resolve this problem would be most appropriate.

The cumulated radiation dose from polonium-210 was calculated by Radford and Hunt to be about 36 rem in 25 years (for two-pack-a-day smokers) as the minimum, and 100 or more rem as the more realistic figure. But their further estimate of the possibility of 1000 rem or more in local hot spots in bronchial epithelium is hardly supported by the case they cite of a hot spot in one subject, who, they estimated, would have received a dose of 164 rem in 25 years from the hot spot they located. Their guess that they would have found a substantially higher concentration 10 days earlier, before the subject stopped smoking, is contradicted by the 138-day half-life of polonium-210 and the probable absence of ciliary action in an individual who had smoked heavily for many years and who was hospitalized for smoke inhalation.

Their concluding view that polonium-210 is only one of the many factors which play a part in the genesis of bronchial cancer in smokers seems much more reasonable than the earlier implication that polonium-210 may be the major factor.

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Freedom in Large Laboratories

The increasing concentration of scientific research in large laboratories may have a tendency to impede progress by stifling the creativity of the individual scientist, as Paul M. Gross suggests [*Science* **143**, 13 (3 Jan. 1964)]. How serious this danger is I do not know, but the example he uses on page 16 about the discovery of xenon tetrafluoride serves rather to indicate the opposite from what is implied. In the first place, the "young physicist" was not working alone but had for years been collaborating on a part-time basis with a group of fluorine chemists at Argonne, and it was with this group that the preparation and identification of the first simple noble-gas compound was accomplished. More to the point, at this large laboratory, the Chemistry Division of the Argonne National Laboratory, it is the policy to give freedom to the individual scientist or group. This particular group proceeded in this and many previous projects without being required to obtain approval by supervisors. Whether such freedom is infrequently allowed in other large laboratories, I am not sure, but in this case I am intimately familiar with the circumstances, as I was the "young physicist."

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