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The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

Spilhaus



## THE MORTON ARBORETUM

Joy Morton, founder

LISLE, ILLINOIS 60532 Phone: WOODLAND 8-0074

March 13, 1968

The Editor, Science  
American Association for the Advancement of Science  
1515 Massachusetts Avenue, N. W.  
Washington, D. C. 20005

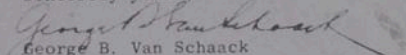
Dear Sir:

In his article 'The Experimental City' (Science, 16 February 1968) Dr. Spilhaus introduces some figures which, after ones horror has subsided, still perplex. Sixty thousand cities of a quarter million population each, uniformly spaced over the earth's land area, would place the center of each approximately 33 miles from its nearest neighbors. If, as he concludes, we must look forward to using 'all our land for living, not just tiny fractions of it', and if 'each such city would be surrounded by ... 64 square miles of open land', it would seem there would be a hexagonal network of open land corridors scarcely more than a mile wide. The remaining area of 861 square miles per city would have an average population of 290 per square mile. This seems perplexingly small. Were the open land to occupy 640 square miles the corridors would be 15 miles wide and the average population 877 per square mile.

But why not 10,000 people per square mile (only 16 per acre) and 900 square miles of open land, the corridors 27 miles wide? Living could be comfortable, perhaps even felicitous, as long as one staid at home. But one could never get further than 14 miles away from thickly settled areas. How infinitely monotonous! How impossible to experience that wildness in which is the preservation of the world!

We must believe that Dr. Spilhaus is serious, and hence that he foresees an ultimate and effective limitation on population, else why should he suggest a plan for any specific figure so large as 15 billions which, immediately exceeded, would proceed to vitiate the plan. His help in showing us how to achieve limitation of population at a figure very much less, say a third as great, would be most welcome. Long before reaching any possible equilibrium in A. D. the presently threatened increase in city size, and the rapidly expanding and ruinous pollution throughout the world may have destroyed us, or, if not, at least have brought about that destruction of essentially all wildness incident to such a solution as Dr. Spilhaus asks us to entertain.

Sincerely yours,

  
George B. Van Schaack  
Bibliographic Consultant

March 13, 1968

Dr. Athelstan Spilhaus, President  
Franklin Institute  
Philadelphia, Pa. 19103

Dear Dr. Spilhaus,

I have been interested to read your paper 'The Experimental City', and have been pleased to find myself in agreement with you on many points. Dispersal of cities is certainly something greatly to be wished for. Monsters like New York and Chicago cannot fail to increase our ills in many ways. But I fail to see what seems obvious to you: 'we must use all of our land for living, not just tiny fractions of it'; unless you have given up all hope of relatively early and fairly drastic limitation of population. The enclosure relates to my belief that you have not, and my hope that you can help in achieving such limitation.

Sincerely yours,

George B. Van Schaack  
Bibliographic Consultant



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realized, but we need to know still more. What is known has not yet been put to use very effectively. The design and construction of methods and materials is a difficult enterprise which demands a kind of specialist who is, at the moment, in short supply. New practices need to be thoroughly tested. And when, at last, we have devised more effective methods, we must convince educators that they should be used. Extensive administrative changes must be made. (The changes required simply to permit the individual student to progress at his own rate are prodigious.) Teachers need to be retrained as skillful behavioral engineers. The common complaint that new materials do not work because the teachers are incompetent is not only unfair, it shows a failure to recognize another point at which the improvement of teaching might begin. Materials are good only if they can be used by available teachers. It is quite possible that materials can be designed which will permit teachers to teach well even in fields in which they have no special competence.

### The Improvement of Teaching

Scientists are wary of being asked about their "values." They hesitate to speak of progress because they are likely to be asked, "Progress toward what?" They are uneasy in suggesting improvements. "Improvements in what sense?" The current fashion is to speak only of educational *innovation*. All that is claimed for a new practice is that it is new. We need a much more positive attitude. The efficiency of current methods of teaching is deplorably low. The change which occurs in a student as the result of spending one day in high school is discouragingly small. We need to improve education in the simple sense of making it possible to teach more in the same time and with the same effort on the part of teacher and student. It is a difficult assignment—possibly as difficult, say, as the control of population or resolving the threat of nuclear war, but there is no more important problem facing America today because its solution will advance all other solutions.

## The Experimental City

With components designed as an experimental system, new cities in open land will open up land in old cities.

Athelstan Spilhaus

A federal commissioner recently expressed an opinion typical of the "hopelessness approach" to city problems when he said, "We cannot, even if we would, dismantle the urban complex." I disagree completely. The overgrown urban complex must be selectively dismantled and dispersed if we are to cure the ills of the megalopolis.

The author is president of the Franklin Institute, Philadelphia, Pennsylvania 19103. This article is adapted from an address presented 27 December 1967 at the New York meeting of the AAAS.

Half of the people in the United States live on 1 percent of the land, and there is a continual drift to the big cities. Urban renewal encourages the increase in the size of the cities. Two- or three-story slum buildings are torn down, and sterile, high-rise, so-called low-cost housing brings more people into the center of the city than ever before, compounding the problem.

Secretary of the Interior Stewart Udall, in an article which appeared in the September, 1967, issue of the *Saturday*

It is the sort of challenge that scientists are accustomed to accept. They, above all others, should appreciate the need to define objectives—to know, in this instance, what it means to teach science. They should be quick to recognize the weaknesses of casual experience and of folk wisdom based on that experience. They, above all others, should know that no enterprise can improve itself to any great extent without analyzing its basic processes. They should be best able to gage the importance of science in the immediate and distant future and therefore the extent of the disaster which will follow if we fail to recruit for science large numbers of our most intelligent and dedicated men and women. It is no time for half-hearted measures. The improvement of teaching calls for the most powerful methods which science has to offer.

### References

1. B. F. Skinner, *The Technology of Teaching* (Appleton-Century-Crofts, New York, 1968).
2. P. J. Hilton, *Science* 147, 138 (1965).
3. G. Polya, *How to Solve It* (Princeton Univ. Press, Princeton, N.J., 1945).
4. This article was prepared with the help of NIMH grant K6-MH-21,775-01.

*day Review*, addressed himself to the fundamental problem, that of controlling the population, and took a stand that must be considered courageous for a man in his position. If we consider that any excess that is harmful to decent living is a pollutant, then the prime pollutant on earth is too many people. But until we have the sense to control population, something has to be done for all these people, and here I discuss the question of what is to be done.

In his article, Udall goes on to say:

Our annual population growth of 4,000,000 people increases the physical and social pressures, causes us to seek quick remedies, leads us to waste too much wealth on quick-fix projects that provide at best a temporary respite from yesterday's mistakes. The razing of tenements, their instant replacement by high-rise slums, changes the facade—not the features—of the ghetto.

I agree completely, and propose, as a corrective, development of a system of dispersed cities of controlled size, differing in many respects from conventional cities, and surrounded by ample areas of open land. The proposed Minnesota Experimental City will be a prototype.

The initial group that planned the Experimental City project in Minnesota

*M. M. ... Spitham*

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# *DÆDALUS*

Journal of the American Academy of Arts and Sciences





THE FRANKLIN INSTITUTE · PHILADELPHIA, PA. 19103 · (215) 448-1262

Athelstan Spilhaus  
President

March 19, 1968

Dr. George B. Van Schaack  
Bibliographic Consultant  
The Morton Arboretum  
Lisle, Illinois 60532

Dear Dr. Van Schaack:

I am afraid that I was not explicit enough in my article "The Experimental City" (Science, 16 February 1968) particularly on page 711. I said that the city would be surrounded by 64 square miles of open land, but I did not say in this article that I would assume an intense living city of a density of perhaps one hundred people per acre. I regret that I omitted this although this kind of a conclusion was made in an earlier article in Daedalus, page 1139, Fall 1967, Volume 96, No. 4, of the Proceedings of the American Academy of Arts and Sciences.

In other words, the dispersed cities are intense living cores surrounded by ample open land. I further misled you by saying we must use all of our land for living. I would use, as you see, a small fraction for the intense living city cores and preserve the open land for living also but not for housing or buildings.

It is entirely my error that you were confused.

Sincerely yours,

Athelstan Spilhaus

cc: The Editor, Science  
American Association for the  
Advancement of Science

$$\frac{2.3 \cdot 10^9 \text{ acres}}{6 \cdot 10^4}$$

$$= .4 \cdot 10^5$$

$$= 40,000 \text{ acres}$$

$$= 64 \text{ sq. miles.}$$

$$\frac{15 \cdot 10^9}{2.5 \cdot 10^4} = 6 \cdot 10^4 = 60,000$$



$$\begin{array}{r} 640 \overline{) 40000} \rightarrow 62 \\ \underline{3840} \\ 1600 \end{array}$$