opportunity costs of such protracted agony or unnecessary babysitting seem unbearable.

Furthermore, in such a model, the number of degrees produced per student enrolled is a function not only of university size but of the student-faculty ratio as well. Thus, the effects of diseconomies of scale can be largely offset over a considerable range of size increases by optimal downward adjustments in the student-faculty ratio. In fact, from both the humanistic and the economic point of view, a strong case can be made for considering optimality in terms of student-faculty ratios rather than in terms of scale. A simulation of the 100 largest universities suggests that if the student's time is considered to be worth about $8000 per year, the cost per degree increase brought about by a reduction of the student-faculty ratio of 22 to 1 to 16 to 1 is nearly offset by the shorter time it takes to get the degree (*2*).

A fear that legislative attention to the degree measure of university output would exert pressures on universities to become diploma mills should not prevent the study of the behavior of degrees nor the search for additional reliable output measures.

Finally, consider the dysfunctions of growth as opposed to those of scale to which Gallant and Prothero have drawn our attention. Growth refers properly to rates of change over time and can be accompanied by various forms of instability. As the authors have pointed out, many institutions of higher education have experienced extraordinary rates of growth as a result of the postwar baby boom. These high rates of growth may have been accompanied by overshooting in numerous forms. The clearest example of overshooting is surely the case of Ph.D. production. Somewhat more subtle difficulties may have also arisen. For example, the rate at which faculty can be graciously and nondisruptively absorbed into existing structures may be much lower than the growth rate experienced by some institutions in recent years. There is some evidence that those institutions which have resisted growth have been least disrupted by the events of recent years. It would be a serious mistake to prematurely conclude that obesity is the problem when overindulgence is the real difficulty.

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References

1. R. R. Hough, in *The Outputs of Higher Education* (Western Interstate Commission on Higher Education, Boulder, Colorado, 1970).
2. ———, *What Economists Do* (Harper & Row, New York, 1972), pp. 69–99.

The rank-order test is valid within the limited domain of highly rated departments which we tabulated. That is, the number of departments in each size increment was approximately constant in the sample we used. Van Nostrand is, however, correct in suggesting that a survey of all departments in the world would be more illuminating.

As weight-watchers, we agree with Hough's distribution between obesity and overindulgence. (The scale principle in biology pertains to the former, rather than the latter.)

Meier has put a backhanded finger on a fundamental problem which underlies the questions raised in our article: the application of the scale principle to *all* social institutions. We limited ourselves to the narrow context of university growth, but universities have not been alone in the recent trend toward expansion and centralization. If the scale principle does apply to social institutions, then dysfunctions of scale should also be identifiable in Big megalopolis, Big government, and Big multinational corporation.

Meier suggests that Big university should be thought of as "relevant preparation" for these other constellations. Indeed it is, and that is what worries us. Before hastening to slot the university neatly into this big "brave new world," we think it prudent to ask, first, whether the entire trend is adaptive for society and healthy for human beings.

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Organic Gardening

Emmanuel Epstein (Editorial, 21 Apr., p. 235) refers to "an amazing recrudescence of quaint lore about 'organic' gardening and food production that reveals an almost total ignorance . . . of the most basic facts concerning the nutrient elements of plants and their absorption."

An example of such ignorance was revealed on a recent television program, when the author of a best-selling

book on nutrition advised the audience to beware of food grown with "chemical fertilizer." This reminded me of the answer given by a freshman just enrolled in a chemistry class to the question: Are the nitrogen and oxygen in air present as a physical mixture or as a chemical compound? He wrote, "Air cannot be a chemical compound, because chemistry was not invented for thousands of years after the Creation."

The boy had only begun to study chemistry and presumably soon learned that synthetic ammonia is the same stuff as ammonia from steer manure, but there are multitudes who shy away from chemistry and easily become the dupes of those who prey upon ignorance. The rise of the cult of "organically" grown food is one more example of the fact that some minds are more open to superstition than to knowledge.

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Women Physicists

The Roster of Women Physicists, for which information was obtained by questionnaires circulated last fall, has just been printed by the American Physical Society (*1*). A supplement to update the present roster is in preparation, and women now listed are being sent new questionnaires. We urge women physicists who have not yet filled out a roster questionnaire to obtain one promptly by writing to E. Baranger, Committee on the Status of Women in Physics, at the address given below.

The term "women physicists" is meant to include women with the B.A., B.S., or a higher degree who are actively engaged in work related to physics and also women with advanced degrees in physics who are working in areas not related to physics or are not presently working.

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Note

1. Copies may be obtained from the American Institute of Physics Placement Service, 335 West 45 Street, New York 10017, at a cost of $5.