Rationale of the Space Program

T. C. Schelling

One night last month eight Americans ran the mile in less than 4 minutes. This news got 3 inches at the bottom of the fifth page in the sports section, and reminded me of a prediction made by Philip Abelson, the editor of *Science*, and quoted by Vernon Van Dyke in **Pride and Power** (University of Illinois Press, Urbana, 1964. xiii + 285 pp. $6.50): "The first lunar landing will be a great occasion; subsequent boredom is inevitable."

Abelson is probably correct as far as the feat is concerned, though a few bug-eyed monsters or a squabble with the Russians over territorial rights might sustain interest indefinitely. If he is right it is nothing to be ashamed of; enthusiasm should be subject to a healthy obsolescence rate. But if the expenses of the lunar landing are charged to national entertainment, we would be wise to write it off as current consumption and not long-term investment.

Entertainment is a motive that Van Dyke does not identify. How much we spend on it depends on whether we include the man-hours spent viewing "The Outer Limits," as well as in producing the program, but by any definition we spend more in a year entertaining ourselves than we shall have spent getting to the moon by the time our man arrives there. Surely the direct costs of John Glenn's voyage could easily be justified as popular consumption, if there were not more serious arguments to advance.

Pride and Power is mainly about how the American space program can be justified. A third of the book is about organization, informative and well written; but two-thirds are about motivation, and that is what interests the author most, and us too. "This book stems mainly from curiosity about the values and interests—the motives or reasons—that inspire political behavior, especially in the field of international relations." Among motives Van Dyke looks at military security both immediate and conjectural, peace and cooperation, science and technology, economics and social progress, national prestige, a variety of "special interests and ulterior motives," and a new one of his own, the one in the title of his book, "pride." In a manner that is gently sympathetic but devastatingly documented, Van Dyke manages to leave the reader persuaded that our space program, and particularly the expensive manned lunar landing, has yet to be blessed with a justification that stands up under scrutiny.

There have been some splendid rhetorical justifications, including destiny, the stars, and man's thirst for knowledge or adventure, but most of them have in their turn been demolished by the rhetorical resources of opponents. There was an old rule that a man who comes home late should have but one alibi, but the moon program's friends keep trying one after another in its behalf. In Van Dyke's book, though, the wife rises above the alibis and takes him in because she likes him. After a skeptical inventory of all the reasons for going to the moon, Van Dyke himself appears persuaded that it is a good idea. While he reserves the right to cast his ballot in secret, he sounds as though he will vote in favor.

His favorite motive is the one in the title, national pride. He distinguishes pride from prestige. Prestige relates to what others think of us and is supposed to be valuable because of the influence it gives us. Pride is how we feel about ourselves. We lose prestige if the French or the Indians think we are second in space and lack stamina, purpose, expertise, or the resources to compete. Our pride suffers if *we* feel ourselves second in space, and doubt our own stamina, pride, technical competence, or national wealth. Van Dyke admits that, for prestige purposes, "It is hard to imagine any national achievement in space that would have a value comparable to a successful manned lunar landing and a return to earth—unless it be a manned exploration of Mars." But he is not at all sure "that the behavior of foreign governments is affected by the beliefs of their officials or their citizens on such questions as whether the United States is ahead or behind and whether it is gaining or losing." He points out that we not only have nothing but impressions and intuitions on which to base a belief that such prestige is valuable, but that we make virtually no effort to find out.

Pride, however, can be judged by less utilitarian standards: if we like achievement for its own sake, we can like it $25 billion worth. Roger Bannister may have made a little money for the first 4-minute mile and he got a lot of attention, some of it short-lived, but if he falls asleep smiling at night, it could be that he is pleased with himself. Van Dyke thinks that we should not be ashamed of wanting to prove *to ourselves* that we can be first to the moon, no matter what it does to anyone else's feelings about us.

Is this just a new alibi for going to the moon, once the other alibis have failed? Or is it an admonition to go ahead and be honest. If we really want to do something just to prove that we can do it, he says, let us not pretend that it will swing Asia to our side, revolutionize the underdeveloped world with live TV broadcasts, solve our earth-oriented military problems, or bring back more scientific knowledge and rare minerals than we could get by spending the money in other ways. Let us just admit that we want to do it. This is still a rhetorical answer to why we want to go to the moon—we want to because it is a challenge, and getting there first an especially poignant one—but perhaps it places the burden of proof on him who says we shouldn't want it, rather than on him who says that such considerations—the prestige, or the knowledge, or the military advantages—are worth all the money.

I do not find it a compelling argument, though I confess I waver. There seem to be three different attitudes toward the lunar program, other than the "don't knows." There are those who, with or without constancy of rationale, are for it; then there are those who consider it a waste of resources and a misplacement of national pride. Third, there are we who waver, one moment thinking it preposterous to set our sights on the moon and to pursue a single-minded expensive program and the next moment thinking that big leaps and gambles are the stuff of progress and that we are lucky there is a discrete luminous object a quarter of a million

The reviewer is professor of economics at Harvard University and member of the faculty of the Harvard Center for International Affairs. His books include *Strategy and Arms Control* (with M. H. Halperin), 1961; *The Strategy of Conflict*, 1960; and *International Economics*, 1958.

miles away on which to focus our energies. I was a waverer before Van Dyke reassured me that challenge, achievement, and pride could justify it, and I still waver. But though pride may not be a persuasive additional argument, it is probably an excellent diagnosis. It may better express what people have tried to say (and sometimes to disguise) than prestige, even though the two may not be quite as distinct as Van Dyke tries to make them.

I like Van Dyke's analogy between Sputnik and Pearl Harbor. I grudgingly admire his defense of President Eisenhower's response to Sputnik. I warmly second his proposal that the correct antonym for *military* is *civilian*, not "peaceful." I fully agree with him that technology is not uniquely decisive in the competition with the Soviets or in our security against any other peril, but that "the security and survival of a state depend at least as much on the wisdom of its policies, especially its foreign policies as on technological strategy." I like his warning that "once the seemingly impossible and incredible has been done and once thoughts are drawn towards a realm that is literally out of this world, the usual standards of discernment seem to weaken. Credulity and the inclination to play upon it seem to increase." His two chapters on the military implications of space I found quite sensible, though his enquiry is mainly directed toward the civilian program. I like his book.

My principal disappointment is that he did not give much attention to whether, granted we want to conquer space and spend tens of billions on it, the rather single-minded, manned, lunar-landing program is the best way to spend the money. Will we win the long-distance race to Mars by winning the middle-distance race to the moon? Are some of the military by-products modest because our civilian program is one that happens to be short on by-products? I have heard some argument that the Manned Orbital Laboratory is worth as much as the moon, and also that our booster program concentrates too many resources on the middle-distance event. There is plenty of evidence that glamour dominates research and development: bureaucratically a solid-fuel missile is more "achievable" than a new rifle for the Marines. Is this what the moon program does, or does it carry on its coattail more space activity than it crowds out of the budget? I don't know, but I'd like to. It is worth noting that some of the most articulate belittlers of the manned lunar landing are space advocates who think we are doing not too much but the wrong things. Van Dyke may have been both wise and modest to confine himself to goals and motives, and to stay out of the inherently more "technical" problem of space-program mix; but in doing so he has somewhat neglected a controversy that, though less popular and political, is fairly insistent and may become more so.

I suppose the concluding paragraph of any book receives the author's special attention and reflects his own feelings. "Before Sputnik," Van Dyke says at the end, "there was apathy about space, and afterwards came what some call hysteria; subsequently, the more the United States has achieved in space, the more signs there are of waning enthusiasm. Sputnik called values into our consciousness of which we previously were unaware, and now that the threat to these values is declining there is a tendency to forget about them again." I feel myself properly chided but not wholly repentant. I hope that perpetual enthusiasm is not the price of persistence.

Entomology

An Introduction to the Study of Insects. Donald J. Borror and Dwight M. DeLong. Holt, Rinehart, and Winston, New York, ed. 2, 1964. xii + 819 pp. Illus. $10.75.

The first edition of this book (1954) provided an excellent modern replacement of an old standby of insect classification, Comstock's *An Introduction to Entomology*. The second edition has been considerably improved, especially in the modification of the keys to the families. The authors have aimed at making it possible for beginning students to identify, to the family, almost any insect found in the United States, and the excellent keys make the achievement of this goal possible. At the same time, the completeness of coverage makes it possible for advanced students to use the book in classifying the higher categories of insects. Those who seek more than superficial treatment of insect morphology and physiology will have to look elsewhere, since the treatment of these topics in the first three chapters (45 pages) is only intended to provide the student with a working knowledge of the terms, which will enable him to operate the keys. However, each chapter in which the orders are treated contains excellent general discussion of the peculiarities of structure, behavior, and ecology of the group under consideration, and the illustrations are excellent and abundant. Six hundred and forty-one of the 819 pages are devoted to the classification of insects, and "most of the keys are complete for all the families occurring in the United States." The second edition has returned to the use of long-familiar family names that had suffered change as a result of name changes of the type genera. Since the rule of priority now covers family names, these names no longer change as older names for type genera are discovered. I welcome back such familiar names as Noctuidae (= Phalaenidae), Pyromorphidae (= Zygaenidae), and many others. Although each chapter contains excellent pointers on special means of collecting and preserving the kind of insects treated, the entire chapter devoted to collecting and preserving insects deserves praise. The inclusion of keys to arthropods other than insects makes available to the serious student means of partially identifying almost any arthropod. An opportunity for the beginning student to study living insects and their ways is discussed in a separate chapter.

A new feature of the second edition is the inclusion of footnotes explaining the Latin or Greek meaning of each order name. Names are much more appreciated when one understands them. However, an unfortunate choice of some names seems unnecessary. It may be desirable to have a uniform suffix for all insect orders, such as "-ptera," but tagging this suffix to certain stems makes the name nonsensical. Embioptera, Psocoptera, and Ephemeroptera are examples of nonsense names, of the same sort that would result from doing the same with Odonata, Collembola, Anoplura, Thysanura, and Mallophaga. The authors point out that there is some difference of opinion among entomologists concerning the grouping of families and orders into higher categories, or the splitting of families and groups into lower categories; Borror and DeLong state their stand on the classification they have adopted, and frequently cite the authority they follow. This feature enables the serious student to explore the various alternative classifications. However, there seems little justification other than tradition for combining the