munication of feeling and the quest for meaning? This is obviously a rhetorical question, and its reverse is even banal. But it remains true that many people who ask and attempt to answer such questions in a professional capacity view with bitterness, disdain, and fear the interweaving of science and contemporary affairs. They are not inspired, but repelled, by the multiplication of choice. What Seaborg calls symbiosis, they call parasitism.

I suggest that, in spite of their tone, these are not irrelevant considerations. Science may have to enlarge its house, to accept that it is not a temple but a kind of rambling, unfinished, temporary shelter, to accommodate this problem.

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Mathematical Authorship

As a mathematician, I have been following the recent discussion about multiple authorship with a certain amount of smugness, since the problem hardly exists in mathematics. Joint authorship is not uncommon in mathematics, but it rarely extends beyond three authors, and the almost universal custom is for the authors' names to appear in alphabetical order. This is so well understood that no mathematician ever assumes that the first author is in any sense the principal one. Moreover, most mathematicians who write joint papers will refuse ever to say who contributed how much. It seems to me that Cleveland's suggestion (Letters, 12 June, p. 1295) that "authors' names should appear in the order of the magnitude of their contributions" would inevitably lead to bad feelings and would not really solve any problems; I hope it will not be taken seriously. I find it shocking that senior scientists are so hungry for credit that they must get their names on everything that they had a hand in. Surely mathematicians are no more altruistic and no less subject to "publish or perish" than other scientists, yet I know of plenty of cases where a senior mathematician has been content with a footnote of thanks instead of joint authorship.

As for papers with thirty or so authors, why cannot a group, even one of varying composition, adopt a collective name, as the Bourbaki group of mathematicians does? To a young scientist, it should be worth more than many individual publications to be able to have it said of him that he has been a member of such a group; an established scientist shouldn't care anyway.

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Overkill and the Defense Budget

The News and Comment article by D. S. Greenberg in the issue of 17 April (p. 271) requires correction.

1) The report *A Strategy for American Security* (Lee Service, 45 East 21 Street, New York, 1963, 50¢) prepared by six colleagues and myself is described in the article as a "disarmament proposal." The "maintenance-of-present-forces budget" proposed therein allowed for maintenance of all the present weaponry and manpower of U.S. armed forces. It would entail a reduction of about $22 billion in military spending, leaving $34 billion—which includes all personnel and operation and maintenance requests of the Department of Defense. Some persons may regard any reduction in a military budget as disarmament, but that is another matter. The maintenance of current U.S. military power is not disarmament.

2) In order to estimate the destructive capability of U.S. strategic forces we assumed that 20,000 tons of TNT-equivalent in the Hiroshima bombing destroyed 100,000 people. Greenberg says, "The generally accepted figure is 68,000—a fact noted for the sake of accuracy, not as a consolation." Since no one has ever observed a nuclear war, all forecasts concerning the effect of the use of nuclear weapons on a large scale involve estimations for circumstances where the error of estimate cannot be known. Gauging the number of fatalities at Hiroshima involves this problem.

The U.S. Atomic Energy Commission (*The Effects of Nuclear Weapons*, 1962, p. 550) says that casualties at Hiroshima included 68,000 killed. The U.S. Strategic Bombing Survey reporting on *The Effects of Atomic Bombs on Hiroshima and Nagasaki* (1946, p. 15), stated that

> the exact number of dead and injured will never be known because of the confusion after the explosion. Persons unaccounted for might have been burned beyond recognition in the falling buildings, disposed of in one of the mass cremations of the first week of recovery, or driven out of the city to die or recover without any record remaining. No sure count of even the pre-raid population existed. Because of the decline in activity in the two port cities, with constant threat of incendiary raids, and formal evacuation programs of the Government, an unknown number of inhabitants had either drifted away from the cities or been removed according to plan. In this uncertain situation, estimates of casualties have generally ranged between 100,000 and 180,000 for Hiroshima . . . the Survey believes the dead at Hiroshima to have been between 70,000 and 80,000.

A Japanese study on *Atomic Bomb Injuries* (Nobuo Kusano, Ed., 1953, p. 60) accounted for 92,000 dead and missing by 2 February 1946, and further found that

> these figures do not include the deaths among the army in the city. According to information published later by Hiroshima City the number of dead, including those in the military employees and Army, and the injured who died in the meantime, is estimated at 210,000 to 240,000. Another estimate put the number of dead as 270,000.

The effect of a warhead like that used on Hiroshima is influenced by many factors—for example, population density, which is much higher in large modern cities. Estimates of deaths at Hiroshima range from 68,000 to 270,000. Deaths traceable to the Hiroshima bombing are still occurring and are not counted. Accordingly, we regard the figure of 100,000 fatalities at Hiroshima as one reasonable yardstick for estimating the destructive power of nuclear weapons.

3) In one of the short papers in the *Strategy* report, entitled "The Military Budget—Is There a Choice?" we presented the administration's defense budget for the fiscal year 1964, the maintenance-of-present-forces budget, and a finite-deterrent budget. The latter was given to illustrate a range of conceivable alternatives. We know from Jerome B. Wiesner that "studies made independently by the U.S. Army and Navy have indicated that, even in the absence of (international) agreement limiting force size and permitting inspection, 200 relatively secure missiles would provide an edequate deterrent." Your article describes the finite-deterrent budget as one "which would limit our military establishment simply to 200 secure missiles." The $9.2 billion of this budget estimate included $3.5 billion for military personnel, $4.2 bil-