Letters

Military Spending

I would like to comment on Garwin's tempting suggestion, as reported by Robert Gillette (News and Comment, 9 June, p. 1108), of a $50 billion "first class" military force. First of all, this assumes a hard-nosed efficiency and thrift which is lacking in all of government, but more important, it means the acceptance of certain policy decisions which the present political climate does not permit. The major decisions would be (i) the use of tactical nuclear weapons in case of minor or medium armed conflicts; (ii) the replacement of our second strike philosophy by that of an instantaneous response to plausible alerts; and (iii) the mass production of relatively inexpensive Minute Man missiles in response to the Russian arms escalation, instead of the development of novel, expensive, and less efficient weapon systems. This latter action is specifically excluded by the SALT agreement.

As long as we want to maintain simultaneously a low military profile for internal consumption and a plausible retaliatory capability to discourage external miscalculations, the inevitable result will be a diffuse, and therefore expensive, military force. The other alternative, of course, is simply unilateral disarmament with a somewhat incalculable risk.

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Robert Gillette's report leaves some misimpressions about my comments. I said, for instance, that the Defense Department could maintain a "first class" military force at $100 billion per year, $80 billion per year, or $50 billion per year, but that we would have to do things quite differently from the way we do them now. I went on to say that, conversely, we could have an ineffective military capability at $100 billion per year, $80 billion per year, or $50 billion per year. The laser-guided bomb and the helicopter-lifted radar are only two examples of the many changes which would have to be made in the present system to achieve adequate capability at any forseeable budget level.

The obstacles faced by the laser-guided bomb (an Air Force development) exemplify the need for new means of evaluation and decision at high levels in the individual services, in the office of the Secretary of Defense, and in the Congress.

Finally, I consider that Thun's "policy decisions" are in no way consequences of my quoted statements, and that his final conclusion is unwarranted.

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Early Man's Food Habits

Although the importance of fire in the evolution of human culture can hardly be overrated, the suggestion by Leopold and Ardrey (5 May, p. 512) that the lack of fire during perhaps 98 percent of man's existence may have limited his expansion, because many toxic vegetable products cannot be used as food without cooking, is questionable. All living, nonhuman primates subsist almost wholly upon uncooked vegetable food, yet they do not have any special detoxifying digestive enzymes not found in man. Presumably, uncooked vegetable products could have formed an important part of the diet of early man under ecological conditions that can now support populations of, for example, baboons or macaques.

That man was able to penetrate farther north into cold temperate climates, where vegetable food gathering is difficult for much of the year, may have been due to the fact that, unlike other primates, he was able to live largely on meat. Fire would have added much to the comfort of life in higher latitudes; but its use for cooking poisonous vegetable products, which, if they are to be detoxified, usually need to be boiled in pots, seems likely to have come much later. By that time selective breeding for palatable and productive crop plants, probably one of the main causes of population increase during Neolithic times, may already have started.

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Goodhart finds our argument about the cooking of foods questionable on the grounds that (i) nonhuman primates eat uncooked vegetable materials and (ii) by the time the cooking of vegetable materials was learned, man might have already selected palatable and productive crop plants.

It is true that nonhuman primates subsist on uncooked vegetable foods, but Goodhart's assertion that they do not have any detoxifying devices shows great assurance in an area of almost zero information. We agree that uncooked vegetables could have comprised the main diet of early man who might have lived in conditions which now support baboons or macaques; yet the archeological evidence has uniformly supported Dart's early observation (*1*) that *Australopithecus* evolved in dry veldt country and not in the verdant forests. No ape has developed the ability to exist away from the products of the tropical forests except the extinct, seed-eating *Gigantopithecus* (*2*). Comparisons of the digestive capacities of hominids with that of the apes and monkeys involves some unreliable analogies; the separation of the hominid line from the ape line occurred an estimated 14 million years ago (*3*), and the monkeys were separated from the ape-hominid line far earlier, probably in Oligocene time. Comparisons of hominids with our closest primate relatives might have the most relevance, and the digestive range of the chimpanzee—certainly our closest primate relative—is strikingly similar to that of man, including a strong appetite for meat (*4*).

The earliest agricultural cultures were based on the grains: wheat, barley, millet, oats, rye, rice, and maize (*5*), and all of these require cooking. Most of the vegetable foods eaten by modern man require cooking. One has to assume either that man was unable to eat these foods prior to his learning to cook, or that early man was resistant to the toxic principles but through a rapid, backward evolution lost that resistance in the few thousand years since the advent of cooking.

We are precisely in agreement with Goodhart's statement that the ability of the hominid man to penetrate ranges away from the tropical forests may have been due to the fact that he was able to live largely on meat.

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The *p*H Concept

With all due respect for S. P. L. Sørenson's brilliant contributions to our understanding of *p*H and buffers (News and Comment, 3 Mar., p. 973), the continued teaching of the concept of *p*H has been an educational disaster. Of our annual class of 250 medical students, only about 40 admit that they "understand *p*H"; in fact, not more than 10 can discuss *p*H meaningfully without 4 hours of reviewing their biochemistry. On the other hand, virtually the entire class is immediately comfortable with the concept of "proton concentration," expressed as a molarity.

The persistence of medical school teachers in pushing the *p*H concept has prevented students from a proper understanding of simple and basic ideas in physiology, pharmacology, and biochemistry. For example, they do not find it immediately obvious exactly how *p*H regulates the absorption of various drugs, since they have to memorize certain rules relating *p*H to proton concentration (no matter how simple these rules may be to the teachers). Similar problems arise in the teaching of renal physiology and buffer biochemistry.

In addition to hindering the education of our future doctors, the *p*H concept has been a precedent for a nightmarish research development, many researchers now express the molarity of Ca^{2+} in terms of *p*Ca. Pharmacologists are starting to use *p*D, *p*C, *p*R, *p*A, etc. The expression of experimental data is becoming "overworked," and the reader is less and less sure of what exactly the researcher has done in his laboratory experiments. The *p*H concept often becomes meaningless in molecular biology. If the *p*H in the mitochondrion is around 7, then there are perhaps a mere 1000 protons in the organelle. The *p*H on the edge of membranes is about 5 to 6, the *p*H in the central plane of the membrane is about 10 or 11. It is more meaningful to think about proton concentrations eith-