

of alternative basing schemes; we agree that no viable new alternatives are likely to be discovered in light of extensive past studies. The central argument that Midgetman should be deployed in a dash-on-warning mode is flawed, however, because it relies on the assumption that 30 minutes of tactical warning would be available. We agree that this is the minimum warning necessary for a dash-on-warning scheme to be viable. On the other hand, if the social and political problems associated with area deployment of Midgetman could be resolved, such missiles would be survivable and could possibly play a stabilizing role.

A warning time of 30 minutes assumes an ICBM attack, but an attack from submarines would only give the 6- to 15-minute SLBM flight time (or less with depressed trajectory). Furthermore, some of this time is needed to detect and confirm the attack, start transporter engines, and so forth. Midgetman is not survivable in a dash-on-warning deployment mode against an SLBM attack. One could not rely on strategic (rather than tactical) warning, either. First, it might not be available; and second, any President might hesitate to give the dispersal order for fear of exacerbating a crisis or sending the wrong political message.

Even if one assumes an SLBM attack is not credible now (because of superior U.S. ASW capability), it is likely to become credible over the lifetime of the system under discussion. In fact, the obvious vulnerability to SLBM attack of Midgetman deployed in a dash-on-warning mode is likely to provide an incentive for the Soviets both to build up the number of submarines off U.S. coasts and to develop a depressed trajectory capability if they do not already have one. Brent Scowcroft and R. James Woolsey have noted that, "according to a recent statement by U.S. naval intelligence, the Soviets have tested short-range/short-time-of-flight SLBM trajectories in support of pursuing a capability, announced as an objective . . . by Admiral Gorshkov, of 'covert launches from short ranges'" (1). In summary, we remain unconvinced of any compelling advantages for Midgetman in the dash-on-warning basing mode.

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REFERENCES

1. B. Scowcroft and R. J. Woolsey, in *American Agenda: Report to the Forty-First President of the United States* (Washington, DC, 1988), Part III, p. 2.

Response: In reply to Altfeld, my article was directed toward "the decision to mod-

ernize U.S. ICBMs" and therefore did not address in detail the issues of balance between the ICBM and the submarine-launched ballistic missile (SLBM) force. Elsewhere (1), I have written with Scowcroft and Woolsey on this subject. It is my strong impression that there is no serious difference between us about the relative role between SLBMs and ICBMs or, for that matter, the nature of the antisubmarine warfare (ASW) threat.

Altfeld inquires what doctrinal (not technical) reasons limit the use of Trident compared to ICBMs in their contribution to deterrence through their capability for prompt attack against military targets. First, one-way communication may be adequate for massive (SIOP—Strategic Integrated Operational Plan) response, but more limited military nuclear responses that have an important role benefit considerably from two-way communication and higher data rates. Second, there will only be 18 Tridents, of which 12 may be deployed, and submarines will have an understandable preference to fire all of their 24 missiles (192 warheads) at once to limit the possibility of detection. This is not limited response. Third, with only 12 boats at sea that may be assigned to our strategic reservoir or to NATO, the available submarine response force is limited. With respect to ASW, I am somewhat familiar with the Navy's Fleet Ballistic Missile Submarine (SSBN) security program and with U.S. ASW efforts. I agree that at present there is no immediate danger of U.S. SLBM vulnerability. However, I do not encourage complacency (which I detect in Altfeld's letter) on this question because submarine survivability is so critical to our security. Furthermore, new threats may emerge, for example, continuous active trailing of the few (large) boats at sea.

Finally, Altfeld misestimates my support for SLBMs in our strategic posture. If a survivable ICBM-basing mode is not realized, then I believe the United States can and should gradually move toward reliance on a dyad—submarines and (stealth) bombers. If this should occur, the Navy will need to consider further changes to doctrine, to strengthened ASW R&D, and even to the development of smaller ballistic missile submarines.

Marsh and Gaines appear to misunderstand the nature of Southwest basing for Midgetman. The missiles would be moved continuously in peacetime to provide an area target of such an extent that a predetermined statistical level of the Midgetman force survives the then present Soviet threat. This survivability would exist even should the Soviets deploy short flight time, depressed trajectory SLBMs off the U.S. coast.

My article attempts to make clear that the proposed Midgetman basing does not rely on tactical warning or dash-on warning, although warning, if available and acted upon, would improve the fraction of Midgetman surviving an attack. Further, it is unfortunate that Scowcroft and Woolsey are quoted on the possibility of short-time-of-flight Soviet SLBM launches in a manner which suggests that they would disagree that land-mobile ICBMs can be made survivable to this type of attack. These individuals and I have made exactly the opposite point (1).

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REFERENCES

1. B. Scowcroft, J. Deutch, R. J. Woolsey, *New Republic*, 8 April 1988, p. 16; *Washington Post*, 3 December 1987, p. A23.

Atlantic Barrier?

In his article "Transatlantic Mexican standoff" (News & Comment, 21 July, p. 245) David Dickson discusses the fact that Signetics (a U.S.-based subsidiary of the Dutch electronics company Philips) has been kept out of Sematech (the Texas-based consortium of U.S. electronics companies). Some of the partners of JESSI (the Joint European Submicron Silicon Initiative) did explore possibilities for cooperation, but found the Americans reluctant to commit themselves. This may have been because they suspected that the U.S. Department of Defense would eventually veto any such cooperation. Within JESSI, the representatives of the European integrated circuit manufacturers, after some deliberation, agreed to cooperate with Sematech on a reciprocal basis. The attitude of the European commission was uncertain, and no firm ruling emanated from an authoritative source. The Atlantic partnership may have to be reconfirmed at a high level by our respective governments. Only then will the lower echelons be prepared to stick their necks out. Whereas glasnost and perestroika are gradually bringing down the Iron Curtain, the Atlantic barrier seems to be going up.

Dickson refers to Anton Heuberger as having chaired the team that produced the JESSI blueprint. The team that prepared the document, however, had no chairman; Heuberger was a prominent member. The council supervising the planning phase was chaired by Ben Veltman of the Technical

University of Delft in The Netherlands.

In the insert "Can Europe survive on chips?" Dickson calls the "mega-project" of Philips and the German companies a "mega-flop" because, soon after it started, "Siemens decided it would be cheaper to buy the chips off the shelf from Japan." The aim of the "mega-project," which began in 1984, was to develop submicron technology. A 4-megabit DRAM (Siemens) and a 1-megabit SRAM (Philips) were used as "vehicles"—the first commercial targets—to be on the market by 1989. It was anticipated that by that time the main competitors would have reached that stage. Philips and Siemens were minor producers of MOS VLSI memories (Philips being an important supplier of bipolar memories), but they both had to take a large leap forward in a comparatively short time.

From a technological standpoint, the "mega-project" is already a success. Of course there is still the problem of building up a strong market position. Siemens, therefore, bought Japanese technology—not chips—in order to produce 1-megabit DRAMS without overloading its own development program. [Philips chose to devel-

op additional products like 64K and 256K SRAMS, as well as a version of the latter using submicron ("mega-project") technology.] As a result, a good quantity of German-made 1-megabit DRAMs are now being sold. These are being followed by 4 megabits made with "mega-project" technology, so Holland will soon be known as a producer of chips 'n cheese as well as of bulbs.

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Early Hominid Mating Systems

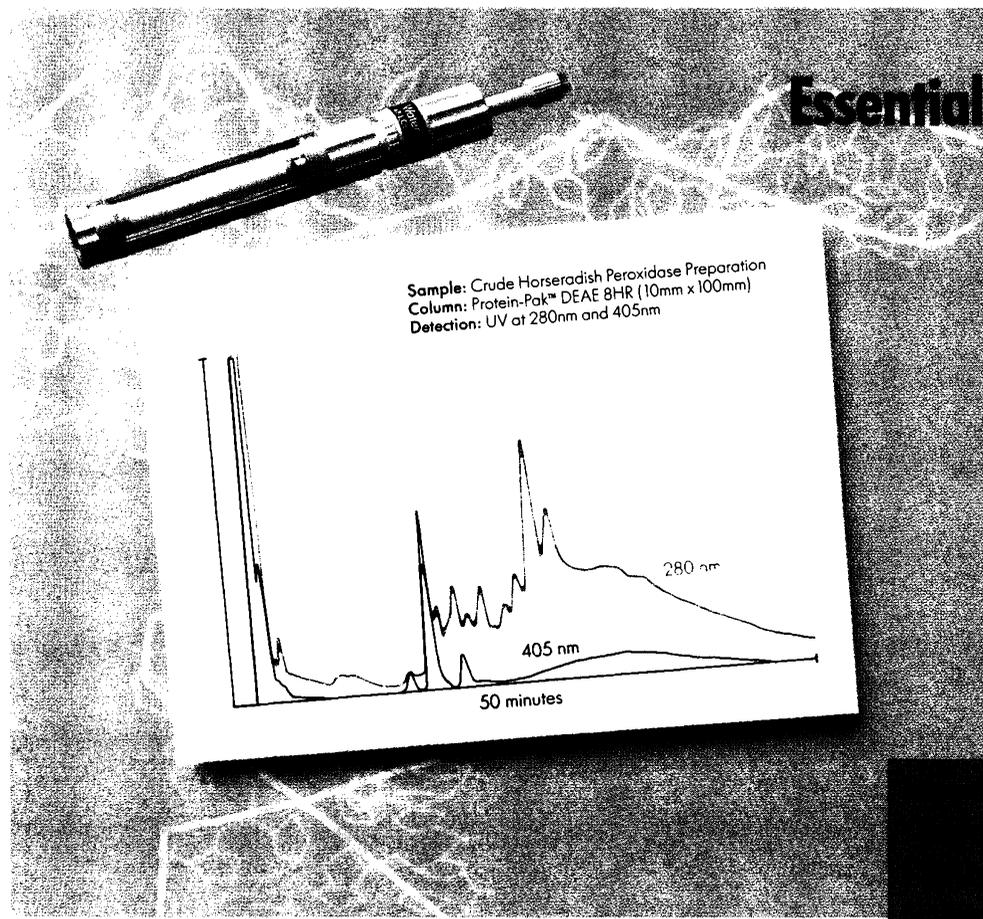
In Table 1 of their article "Finite social space, evolutionary pathways, and reconstructing hominid behavior" (17 Feb., p. 901), Robert A. Foley and Phyllis C. Lee incorrectly characterize my model of early hominid social systems both in relation to its "key behavioral features" and to its "social structure," listing the former as "female mate choice and sexual selection" and the latter as "pairbonds (monogamy)." The key mechanism I proposed is what Darwin

called "double selection," that is, both male competition and female choice and female competition and male choice. Likewise although I discussed various hominid mating systems, my key argument was that ape-hominid speciation (and bipedalism) occurred through intense male competition by means of nuptial food gifts to females of scavenged brains and bone marrow. I argued that, while males tried to mate with and control several females (resulting in polygyny), females tried to increase their access to food gifts through multiple matings (resulting in polyandry), and hence that the earliest hominids were to some degree promiscuous.

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Erratum: The Author Index to volume 244 that appeared between pages 1480 and 1481 of the issue of 29 September 1989 covered the months July–September 1989, not "April–June 1989," as printed.

Erratum: The credit line for the photograph of the U.S. Capitol building accompanying Joseph Palca's article "The pill of choice?" (News & Comment, 22 Sept., p. 1319) should have read, "John Ficara/Newsweek."



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