Letters

DNA Fingerprinting

Colin Norman's News & Comment article "Caution urged on DNA fingerprinting" (18 Aug., p. 699) does not adequately or fairly represent the issues at hand. The article clearly leaves the impression that there have been years of flawed work and incompetent testing in the field. The article does not mention that LIFECODES Corporation has done the DNA typing in more than 80 cases that have been tried with the use of DNA evidence and that in more than 90% of those cases the data were examined by research scientists and subjected to admissibility hearings. In every one of those instances the validity of the test and admissibility of the results were affirmed. Further, in the 14 August ruling, DNA evidence did not, as indicated by Norman, fail in its first "serious" judicial challenge.

Quoting Justice Gerald Sheindlin's conclusions (*1*):

1. There is general scientific acceptance of the theory underlying DNA identification.
2. DNA forensic identification techniques and experiments are generally accepted in the scientific community and *can produce reliable* [emphasis added] results. Hence, the *Frye* standard of admissibility is satisfied.
3. A pre-trial hearing should be conducted to determine if the testing laboratory substantially performed the scientifically reliable results to be admissible as a question of fact for the jury.
4. After a pre-trial hearing in this case [Castro], the DNA identification evidence of exclusion *is deemed admissible* [emphasis added] as a question of fact for the jury. The testing laboratory did substantially perform the scientifically accepted tests thereby obtaining sufficiently reliable results, within a reasonable degree of scientific certainty.
5. After a pre-trial hearing in this case [Castro], the DNA identification evidence of inclusion *is deemed inadmissible* [emphasis added] as a matter of law. The testing laboratory failed in several major aspects to use the generally accepted techniques and experiments for obtaining reliable results, within a reasonable degree of scientific certainty.

This constitutes the decision and order of the Court.

From Justice Scheindlin's decision, we think it is clear that he was able to see through a number of issues that the defense in the Castro case blew out of proportion. We agree that the inclusionary aspect of this data had some ambiguities that were a function of the samples as well as the probes and technology in use in 1987. When tried against 1989 standards, these data were not as compelling as they could have been. Unfortunately, the membane on which the DNA was examined had been exhausted by repeated hybridization and could not be further analyzed with the use of the probes and technology available in 1989, when the case finally went to trial. However, that does not invalidate the results that were generated, especially when they are viewed in conjunction with all the evidence in the case.

We welcome the use of pre-trial reviews and the development of standards. As pioneers in this field we have not only led in the development of the technology but have had to set standards for our work that would, as far as possible, anticipate all scientific and legal scrutiny. If a serious judicial test has "failed to put sufficient limits" on forensic DNA typing, then perhaps defense attorneys are beginning to be confronted with having to accept the reality of scientific data that is valid, reliable, and powerful.

On 15 September 1989, Joseph Castro pled guilty to murder and admitted that the blood on his watch was that of the victim, Vilma Ponce. This is exactly the conclusion arrived at by the scientists at LIFECODES after they examined the results of the RFLP (restriction fragment length polymorphism) test.

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REFERENCES

1. *State* v. *Castro* (S. Ct.), Bronx County, NY, Opinion of Gerald Scheindlin, 14 August 1989.

DOE Supercomputer Resources

Marjorie Sun's article on supercomputers (Research News, 11 Aug. p. 596) mentions the Department of Energy in passing but ignores the department's 15-year success in providing supercomputer resources to its grantees and contract researchers in universities, national laboratories, and industry.

The specific instance mentioned by Sun, analysis of DNA structure by Suse Broyde and Brian Hingerty, is part of a comprehensive, competitve DOE program to provide large blocks of supercomputer time for "Grand Challenge" problems (a term coined by Kenneth Wilson). Under this program the equivalent of approximately 36,000 Cray-1 hours were provided this year on Cray 2, Cray X-MP, and ETA-10G computers to tackle 17 different problems in fields such as semiconductor design, elementary particle physics, ultrahard materials, and high-temperature superconductivity, an average of more than 2,000 hours per problem. (The Cray-1 hour is a convenient, if obsolescent, unit for measuring computing resources on different supercomputers.) The intent of this program is to determine whether large amounts of supercomputer time devoted to individual problems can make a decisive contribution to the solution of these problems. As in Broyde and Hingerty's case, we think the answer will be yes, and we expect to continue this program in future years.

Although DOE's supercomputer resources are often erroneously considered to be devoted solely to military applications, the Office of Energy Research funds supercomputer centers at Lawrence Livermore Laboratory and Florida State University, whose computers (including two Cray 2's, a Cray X-MP, a Cray 1, an ETA-10G, and a Cyber 205) are used by over 1,000 researchers in more than 90 universities, in addition to researchers in national laboratories and industry. These computers are directly served by MFENet and ESNet and can be accessed through several other networks as well. They are devoted solely to open, unclassified research.

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ICBM Modernization

John M. Deutch provides an interesting and thought-provoking discussion of "The decision to modernize U.S. intercontinental ballistic missiles" (ICBMs) (Articles, 23 June, p. 1445). Unfortunately, Deutch's comments tend to perpetuate some errors that need to be corrected if we are to adequately judge the need for ICBM modernization and the type of modernization that might be most desirable. First, Deutch implies that the ICBM force is somehow the sine qua non of strategic capability. This may have been the case when submarine-launched ballistic missiles (SLBMs) were less accurate and provided only the "counter value reserve." However, with the deployment of the D5 missile, this difference will disappear. The Fleet Ballistic Missile Submarine(SSBN) force will be able to attack the full spectrum of targets in the Soviet Union, which Deutch himself admits.

Second, Deutch implies that our SSBN force is not as "controllable" as are our ICBMs. In fact, on-alert SSBNs are in constant communication with higher headquarters, and the fact that they are is continuously verified by an exhaustive monitoring program. In addition, the SSBN force is just as likely to receive an Emergency Action Mes-

sage as is the ICBM force, should one be issued, and may even receive it before the ICBM force does. It is true that, in order to enhance survivability, communication to the SSBN force is not two-way. However, as long as one-way communication is reliable, which can be demonstrated, the need to spend the money that would be necessary to obtain secure two-way communication is not obvious today. Finally, while Deutch asserts that there are "doctrinal" reasons for not relying on Trident, he does not tell us what these might be.

Third, there is citation of the dreaded "ASW [antisubmarine warfare] breakthrough." No one can prove that such a breakthrough will not occur. The Navy does, however, maintain an extensive program designed to ensure the security of its SSBNs. This program is subject to comprehensive, national-level oversight. The oversight groups agree that there is no danger of such a breakthrough in the foreseeable future. Furthermore, even if there were to be a breakthrough in detection, the problems inherent in turning detection into kill would remain nontrivial. In this context, it might be pointed out that, while the air is certainly at least as transparent as the ocean, few people have cited this transparency as a bar to the survivability of mobile ICBMs.

In the end, the real role of ICBMs would appear to be, in the words of Brent Scowcroft and R. James Woolsey (*1*), to "augment" the Trident force. The most important question about ICBM modernization, then, and one that Deutch does not ask, let alone answer, is just how large and powerful such an augmentation needs to be and just how much survivability is affordable for it given this role?

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

Deutch argues that land-based missiles need to be modernized for three reasons: (i) as a hedge against a possible Soviet antisubmarine warfare (ASW) breakthrough, (ii) because ICBMs remain the most controllable part of the triad for prompt and selective nuclear response, and (iii) to show "our allies and adversaries that the United States still possesses the political resolve to field a weapons system that . . . is considered a principal measure of deterrence and political military might." Having looked at the ASW problem in some detail, we remain unconvinced of the likelihood of a breakthrough by the mere statement of the possibility. The difference in promptness between submarine-launched ballistic missiles (SLBMs) and ICBMs is not significant. The "selective nuclear response" argument has some validity, not because of "a host of technical and doctrinal reasons," but simply because it would require launching individual missiles, which could potentially compromise a ballistic missile submarine's location. While this is indeed a problem, it is not insoluble. If land-based ICBMs are to have a role in the future, it will likely be related to this suggestion of selective nuclear response. The demonstration argument is unconscionable given the high cost of the suggested Midgetman system and current fiscal constraints.

In general, we found the article a valuable contribution, particularly for its discussion

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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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 modernize 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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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