convenient indicator of sociality in North American marmots, are consistently and significantly lower in *M. marmota* than among *M. olympus*. Yet, physical proximity, chasing, and play-fighting frequencies indicate comparable social tolerance and colonial organization. This finding suggests the need for a multiple-parameter approach to the evaluation of comparative sociality, since the evolution of social behavior in the genus *Marmota* has apparently involved the independent elaboration of various distinct social characters. In addition, annual breeding appears to be the rule in *M. marmota*, although biennial reproduction might be anticipated. The case of this species may be somewhat confounded, however, since it appears to be a recent inhabitant of high-altitude meadows, where it is a refugee from human hunting pressures. In any case, litter size in *M. marmota* appears to be significantly smaller than in the Olympic marmot, suggesting that the former may achieve the same ultimate reproductive modification by a different proximate strategy.

Further studies are clearly indicated: the steppe-dwelling Asian marmots require attention, as do the little-known Vancouver and Brower's marmots of North America. In addition, the general theory described here would predict adaptations approaching those of the woodchuck among yellow-bellied marmots living at low elevations in eastern Washington, and adaptations similar to those of the Olympic marmot among woodchucks at high latitudes in Alaska. Much remains to be learned.

The marmots present an unusually good system for the ecological and evolutionary analysis of social systems in vertebrates. If anything, the correlations revealed between environment and social behavior in marmots may appear to be too distinct at present, the adaptive values too obvious. There are more predictions to be tested and further studies may well show that the theory of the evolution of marmot societies described herein is far more complicated than it now seems to be. Konrad Lorenz has suggested that biologists should practice discarding one cherished notion every day before breakfast. In any case, continued efforts should advance the goals of socioecology by further revealing the correlation between environment and social biology within this genus.

References and Notes

1. J. H. Crook, *Anim. Behav.* **18**, 197 (1970).
2. ———, in *Social Behaviour in Birds and Mammals*, J. H. Crook, Ed. (Academic Press, New York, 1970), p. 103.
3. R. S. Hoffmann and C. F. Nadler, *Experentia* **28**, 740 (1968).
3a. R. L. Rausch and V. R. Rousch, *Mammalia* **35**, 85 (1971).
4. J. F. Downhower and K. B. Armitage, *Am. Nat.* **105**, 355 (1971).
5. R. L. Snyder and J. J. Christian, *Ecology* **41**, 647 (1960); R. L. Snyder, D. E. Davis, J. J. Christian, *J. Mammal.* **42**, 297 (1961); R. L. Snyder, *Ecology* **43**, 506 (1962).
6. F. H. Bronson, *Anim. Behav.* **12**, 470 (1964).
7. W. J. Hamilton, *Ann. Carnegie Mus.* **23**, 87 (1934).
8. D. P. Barash, *Anim. Behav. Monogr.* **6**, 171 (1973).
9. J. A. King, *Contrib. Lab. Vertebr. Biol. Univ. Mich.* **67**, 1 (1955).
10. K. B. Armitage, *Anim. Behav.* **10**, 319 (1962).
11. J. Downhower, thesis, University of Kansas (1968).
12. B. L. Welch, in *Medical Aspects of Stress in the Military Climate* (Government Printing Office, Washington, D.C., 1964).
13. V. C. Wynne-Edwards, *Animal Dispersion in Relation to Social Behaviour* (Hatner, New York, 1962).
14. D. Lack, *Population Studies of Birds* (Clarendon, London, 1966).
15. W. D. Hamilton, *Am. Nat.* **97**, 354 (1963).
16. D. P. Barash, *Anim. Behav.* **22**, 257 (1974).
17. ———, *ibid.* **21**, 579 (1973).
18. ———, *ibid.* **22**, 446 (1974).
19. ———, in preparation.

20. K. B. Armitage and J. Downhower kindly permitted access to their unpublished data, although they are not responsible for the interpretations here presented. This article is affectionately dedicated to Dr. John T. Emlen, Jr., on the occasion of his retirement after many productive and inspiring years with the Zoology Department of the University of Wisconsin.

NEWS AND COMMENT

Test Ban: Arms Control Groups Denounce Summit Treaty

The threshold nuclear test ban treaty signed at the recent Moscow summit will not be ratified by the U.S. Senate if ratification depends upon the support of those scientists and independent arms control specialists who have been trying longest to put the nuclear genie back in the bottle.

The American and Canadian Pugwash executive committees have described the proposed treaty as a "mockery" (see box). The Arms Control Association (ACA) has decided to oppose the treaty as worse than no treaty at all. The Federation of American Scientists (FAS) regards the treaty as a "counter-productive sham" and will urge that the negotiators return to the bargaining table and seek a better one.

Taken together, the ACA, the FAS, and the American Pugwash participants —these groups actually overlap in membership and even in their leaders— represent an influential source of advocacy and advice on arms control issues. They often have been critical of Administration arms policies.

Among the Pugwash participants are such eminent figures as George Kistiakowsky of Harvard, once science adviser to President Eisenhower; Harvey Brooks, Harvard dean of engineering and applied physics; and Bernard Feld of MIT, secretary-general of Pugwash. Feld is also a leader of the Council for a Livable World, a group formed in the early postwar years which is close to many of the senators most interested in arms control because of its financial contributions to their election campaigns. Feld and Kistiakowsky, along with certain other American Pugwash scientists, have been outspoken critics of U.S. policies in regard to nuclear arms.

The FAS, a Washington-based group with a membership of 6500 and a list of sponsors that includes 33 Nobel laureates, was established in 1946 as the "Federation of Atomic Scientists" and has always viewed the control of nuclear weapons as an overriding concern.

The ACA, which has about 400 members, was formed in Washington in 1971 by a number of individuals with extensive experience in the field of arms control. Its officers and directors include persons such as William C. Foster, former director of the Arms Control and Disarmament Agency (ACDA); Herbert Scoville, Jr., former director for science and technology at the Central Intelligence Agency and later assistant director for science and technology at ACDA; and Herbert F. York, who was once director of defense research and engineering in the Department of Defense.

The Moscow treaty puts these several groups of arms control advocates in an ironical posture. They generally

have not had enough political influence to bring about White House adoption of arms control positions opposed by the U.S. military and its principal supporters in Congress. But they could now well have influence enough to prevent ratification of this proposed treaty which is (as will be later explained) not consistent in any case with the kind of test ban favored by about a third of the Senate.

The treaty would ban weapons tests above 150 kilotons, a threshold much higher than had been expected by arms control specialists. The exemption of underground tests in the Limited Test Ban Treaty of 1963 resulted from the failure of efforts to reach agreement on the then crucial issue of onsite inspections. The United States contended that such inspections were necessary because distant underground explosions could be confused with earthquakes. Since then, however, improvements in seismic monitoring have made possible the unambiguous identification of nuclear tests of yields down to perhaps 12 kilotons or less. The FAS has held that any threshold prescribed for a test ban should correspond to verification capabilities.

As the statement by the Pugwash groups indicates, the high threshold is not the only feature of the Moscow treaty condemned by many advocates of arms control. In addition, there is the fact that it would not come into force until 31 March 1976, with both sides to be free during the interim to carry on unrestricted underground testing. Further, the treaty exempts—at Soviet insistence—"peaceful" nuclear explosions even though such explosions are indistinguishable from weapons tests in the absence of onsite verification. Such verification is not provided for under the treaty and there is no assurance that this problem will be resolved in the follow-up negotiations that are to begin soon. The recent Indian test, widely regarded as a fur-

"The Uncontrolled Atom: A Crisis of Complacency"

Seventeen years ago a number of senior scientists from the United States, Canada, the Soviet Union, and other nations met for the first time at Pugwash, Nova Scotia, to share their mutual concern about the dangers of the nuclear arms race. This and subsequent annual meetings of the "Pugwash" scientists contributed to increased understanding of arms control issues and helped bring about the Limited Test Ban Treaty of 1963. The 1974 Pugwash meeting will be held at Baden, Austria, at the end of August. On 13–14 July, the executive committees of the Canadian and American groups that will go to Baden met at Pugwash for what was supposed to be a routine business session. But, as one of the participants has explained, a joint statement of alarm by the two groups emerged spontaneously from a common perception of a "great clevage between appearances and reality" with respect to the control of nuclear weapons. The statement, which was approved without dissent, is unusual in that Pugwash groups normally do not try to formulate agreed upon positions for public announcement. Some key portions of the statement are excerpted below:

In the past few years we had all become complacent. A series of international agreements—the Limited Test Ban, the Nonproliferation Treaty, SALT I—seemed to show progress, at last, in the effort to control the nuclear arms race. . . .

Then came the rude awakening.

The first shock was the Indian test of a nuclear explosive. . . .

Next came President Nixon's offer of nuclear powerplants to Egypt and Israel, and the sale of nuclear reactors by France and the United States to Iran. Although nuclear energy may have an important role in assuring adequate supplies of energy for all nations, these same nuclear reactors produce plutonium that can be used to construct nuclear weapons. . . .

During this period, and for the first time since 1965, all five of the nuclear powers conducted nuclear weapons tests. . . .

Finally came the shambles of the Moscow summit. The inability to reach agreement on limitation of strategic nuclear weapons virtually guaranteed a new major increase in the already astronomical level of overkill available to the superpowers. A new cycle in the arms race is about to begin: MIRV's for the U.S.S.R.; MARV's for the U.S.; B-1 bombers and Trident submarines for the U.S.; SS-17's and SS-18's for the U.S.S.R. And so on and on and on.

The ultimate mockery at the summit was the "threshold test ban." Here is an agreement that, in the guise of restraint, permits underground explosives equivalent of 150,000 tons of TNT. That is ten times larger than the bomb that obliterated Hiroshima, and larger than almost all the tests conducted by the U.S. and the Soviet Union in recent years. The agreement furthermore is not scheduled to go into effect for almost two years (an opening that has resulted in a prompt request for $100 million by the [AEC] to do some big bomb tests before the 1976 deadline).

. . . Somehow, we must dispel the complacency [about the nuclear threat] and restore a sense of urgency and concern. For individuals as for nations, an ethic of arms control must replace the ethic of the arms race.

Signing the statement as members of the Canadian Pugwash group were Norman Z. Alcock, director of the Canadian Peace Research Institute; Giovanni Brenciaglia, Ontario Hydro; Harry S. Crowe, dean of the Joseph E. Atkinson College, York University; William Epstein, special fellow, United Nations Institute for Training and Research; John C. Polanyi, professor of chemistry, University of Toronto; Omond Solandt, retired chairman of the Science Council of Canada; and J. Tuzo Wilson, director of the Ontario Science Centre.

Signing as members of the United States Pugwash group were Thomas B. Adams, treasurer of the American Academy of Arts and Sciences; Harvey Brooks, dean of engineering and applied physics, Harvard; Abram Chayes, professor of law, Harvard; Carl Djerassi, professor of chemistry, Stanford; Bernard Feld, professor of physics, MIT [and secretary-general of Pugwash]; George Kistiakowsky, professor emeritus of chemistry, Harvard; Franklin A. Long, Henry Luce, professor of science and society. Cornell; Frank Press, chairman of the department of earth and planetary sciences, MIT; George Rathjens, professor of political science, MIT; Alexander Rich, Sedgwick professor of biophysics, MIT; and John Voss, executive officer of the American Academy of Arts and Sciences.

ther step toward a dangerous nuclear proliferation, was described by New Delhi as a peaceful explosion.

In a telephone interview with *Science* reporters, four members of the American Pugwash group—Kistiakowsky, Feld, Alexander Rich (professor of biophysics at MIT), and Abram Chayes (Harvard law professor and a former legal adviser to the Secretary of State)—elaborated on some of the views set forth in the formal statement prepared by the Canadian and U.S. Pugwash groups at their 13–14 July meeting. The four were interviewed simultaneously in a conference call.

Kistiakowsky disputed a statement by Secretary of State Henry Kissinger to the effect that the threshold treaty would discourage deployment of newly designed warheads with an explosive yield greater than 150 kilotons. Kistiakowsky said that, given the highly advanced state of weapons technology, a weapon can be tested at a yield below the 150-kiloton threshold in complete confidence that the weapon to be deployed will, with certain changes, work at much higher yields.

"By making a specified change, you will get [yields of] 300, 500, a megaton," Kistiakowsky said. "This is absolutely scientifically sure. There is no inhibition." Kistiakowsky's acquaintance with nuclear weapon design extends back to the Manhattan project, in which he directed development of the explosive triggering devices for the first atomic bombs.

Neither Kistiakowsky nor the others interviewed saw any redeeming merit in the fact that the treaty would provide for an exchange of geophysical information about the U.S. and Soviet nuclear test sites. "You can be sure that you can detect a nuclear explosion of one-tenth that [150-kiloton] magnitude by existing means," Kistiakowsky said. "The whole thing is simply a fraud. . . ."

Later, Rich gave this characterization of the summit talks: "One way of describing these negotiations at the summit is [that] it's the military of both sides negotiating with the civilian component of both sides. The net result of the summit decision was a clear-cut victory for the military of both sides and a clear-cut defeat of those civilians in this country interested in arms control and those civilians in the Soviet Union interested in the same way."

There is a strong feeling among the four who were interviewed that the SALT agreements have, if anything, stimulated the arms race.

RICH: "The effect of this most recent agreement is to stimulate the AEC to ask for large tests, which I think they wouldn't have asked for otherwise."

FELD: "We have seen the effects in a number of ways, as the result of SALT I. SALT I seems to have been treated, at least by the American military and its spokesmen in Congress, as a license to accelerate all programs which are not prohibited."

CHAYES: "And I think you can say the same about the Soviet military. . . . I don't think, and I don't think anybody else in the group felt, that the blame, if blame there is, is to be allocated exclusively or overwhelmingly to one side or another."

Andrei Sakharov does not believe that there can be a true United States–Soviet détente—with real progress in matters such as arms reduction—until the problem of the Soviet dissidents is resolved in favor of greater freedom of expression in the Soviet Union. Reminded of this, Chayes and Feld indicated their disagreement with Sakharov's view.

CHAYES: "We've got a lot of free expression here, and we haven't made much progress."

FELD: "I admire Sakharov tremendously, but I think that's probably a rather extreme position. There are mutual interests to controlling nuclear armaments. There are forces and pressures in the Soviet Union in this direction as well as in the opposite direction."

One of the matters of the greatest concern to the four Pugwash participants was that the proposed threshold treaty might undermine the Nonproliferation Treaty (NPT), to which Japan, West Germany, Israel, and a number of other potential nuclear powers are not yet parties.

Chayes spoke to this problem: "As you know, there have been very serious objections to the NPT on the grounds that the nuclear powers were not accepting any obligation of any kind—that [the treaty] was discriminatory. The nuclear powers agreed under Article 6 of the treaty to negotiate in good faith for reduction of strategic weapons and for a comprehensive test ban. Now, the nonnuclear powers have clearly been dissatisfied with the progress that has been made. When you add that with the Indian test, the question arises whether the nonnuclear powers now will feel that things have gone so far that there is nothing left for them [in the] treaty."

FELD: "To add insult to injury, so to speak, is the fact that this [threshold] treaty excludes peaceful testing. The United States and the Soviet Union are somehow saying that these kinds of tests might be terribly important at the same time we have been trying to tell the other nations that there is no real need for this kind of testing. It really is very hypocritical. . . ."

As much as they deplored the threshold treaty, the four Pugwash participants were not altogether of one mind as to whether the Senate should reject it. Kistiakowsky and Feld indicated that its rejection would be all to the good. Chayes, on the other hand, expressed concern that such an action might come across ambiguously, with the public left to believe that the Senate was rejecting the President's policy of détente.

Feld then observed that, a few years ago, the Senate Foreign Relations Committee simply returned the Geneva protocols banning chemical and bacteriological weapons to the White House, recommending that the President reconsider the reservations he had attached to exempt herbicides and riot-control agents.

There are currents of opposition in the Senate that make rejection of the threshold treaty—or no action on it at all—realistic possibilities. A two-thirds majority of the Senate is required for ratification. And slightly more than one-third of the Senate has already indicated that it would be unhappy with a threshold agreement that did not also involve phasing out nuclear testing altogether, according to an agreed upon timetable.

In a letter to President Nixon on 27 June, the day he left for Moscow, 31 Democrats and 6 Republicans expressed "serious reservations" about the threshold agreement then under negotiation. They said that it could raise new problems—such as the accurate determination of explosive yields close to the threshold limit—and that it was "not likely to contribute very much toward the critical goal of encouraging restraint on the part of other states that could develop nuclear weapons."

Significantly, the signers of the letter (which originated in the offices of Maryland Republican Charles McC. Mathias and Massachusetts Democrat Edward M. Kennedy) included a narrow majority of the Senate Foreign

Relations Committee, whose approval is essential before a floor vote can be taken. The Foreign Relations Committee will not begin formal consideration of the treaty until it is submitted by the White House, probably early next year. In August, however, the committee plans to hold extensive hearings on U.S.–Soviet relations in general and arms control agreements in particular.

In the meantime, Senator Kennedy and other signers of the June letter (including Maine Democrat Edmund S. Muskie, chairman of the foreign relations subcommittee on arms control) are inclined to withhold final judgment on the treaty until further negotiations clarify its application to peaceful nuclear explosives. At present, Kennedy added in an interview, "It is not clear that this treaty is better than nothing."

—LUTHER J. CARTER and ROBERT GILLETTE

Butner: Experimental U.S. Prison Holds Promise, Stirs Trepidation

In the flat, muddy little town of Butner in North Carolina, the Federal Center for Correctional Research, the government's flagship for modern criminal rehabilitation, is slowly taking shape. Scheduled for completion last April, it will probably open sometime in 1975.

The Butner facility, originally (and unfelicitously) christened the Center for Behavioral Research, has been a gleam in the eye of the Bureau of Prisons (BOP) for over a decade. But it was not until 1969, when President Nixon asserted that something had to be done about crime in America and directed BOP to become the model for corrections on all levels, that money became available for construction of the $13.5 million complex.

If the stated plans for treatment of inmates in the new prison become a reality, Butner could indeed be an unprecedented breakthrough in "corrections," a much-used term which so far has proved to be of little substance in this country's penal system. At best, Butner could supply a humane and noncoercive environment where prisoners would learn interpersonal and vocational skills that would reverse patterns of self-destructive behavior and set them on the track to satisfying and socially acceptable lives. But at worst, some say, Butner could become a place where novel forms of punishment and repression could be carried on under the name of treatment.

The plans for Butner, largely formulated by psychiatrist and warden-to-be Martin G. Groder, have aroused considerable skepticism among those concerned with prison reform and the rights of institutionalized individuals. The envisaged programs sound benign enough, but for people who are familiar with the way the prison system can subvert good ideas, they may sound too good to be true. Butner is coming online at a time when technologies for the manipulation of human behavior have been flowering. In the past few years there have been alarming reports of the use in prisons of psychosurgery; the administration of drugs for purposes of aversive conditioning; and other punitive techniques, ranging from shock treatments to solitary confinement, that now commonly go under the rubric of "behavior modification." BOP officials have many times affirmed that none of these practices will be used in Butner. Nor does it bear any relation to project START, an "institutional adjustment" program for antisocial inmates, that was recently terminated at the Springfield, Missouri, federal penitentiary. Nonetheless, any activities in the penal system that go under the name "research" are regarded with suspicion by civil libertarians, and with downright fear by the increasing number of prisoners who see themselves as victims of political and racist oppression.

What's more, the fact of the Butner facility highlights conflicting philosophies in the field of corrections, which is now in a state of massive confusion. A major current trend is toward deinstitutionalization. People who are down on jails believe that the institutional setting is too dehumanizing for any meaningful rehabilitation to take place, and that any experimental programs should be carried out in communities. Others say that institutions are not necessarily bad, and point out that so long as it is necessary to incarcerate some people there must be some way to make the experience useful. Groder belongs to the latter school.

The original idea for Butner sprang from a long-standing need, as perceived by the BOP, for more federal inpatient psychiatric facilities to supplement the only unit now in existence, the Springfield Medical Center in Missouri. (Another one is planned for the West.) Subsequently, as various rehabilitation programs made their way into federal prisons, it was decided that the Butner facility should have another component, a unit to evaluate these programs on regular federal prisoners. Butner will therefore comprise two institutions in one complex. The inpatient facility, divided into three sections, will house a total of 140 short-term psychiatric patients.

The research part, which has been the focus of all the controversy, is designed to house 200 prisoners drawn from various federal prisons in the eastern United States. They will be randomly assigned to four separate communities called "correctional program research units," each of which is devoted to conducting a program which combines in various ways group therapy, individual counseling, educational instruction, vocational skills training, and physical education. Each program will offer a way—in the terms of transactional analysis, of which Groder is a student—to turn an individual from a "loser" into a "winner." "Different roads to the mountaintop," explains Groder.

Groder has settled on five programs as candidates for the four program slots. They are as follows:

- Asklepieion. This is a group therapy technique which Groder himself devised in his previous job as psychiatrist at the Marion penitentiary in Ohio and will be run by an ex-prisoner, a transactional analysis counselor trained by Groder. It combines Eric Berne's transactional analysis, techniques of Synanon therapy (otherwise known as "attack therapy"), and primal therapy. Prisoners will work out a "life plan"