work against, instead of with, the ecological dynamics of the vegetation. Working contrary to the ecosystem is always expensive and difficult, especially so with chaparral species because they are adapted to an environment that is submarginal or detrimental for most species. Furthermore, chaparral is a fire type and the plants sprout or have seed that can survive in the soil for many years.

Fire records in southern California show that all the mountainous chaparral-covered land is burned periodically. The fires may be caused by man or nature and even the best protected areas are not immune to destruction. In 1960 the 17,000-acre San Dimas Experimental Forest, almost pure chaparral, and used for watershed research, was swept by fire even though the forest was closed to the public, had a network of roads, and several fire fighting units located on its perimeter. The fires started by lightning and consumed 12,000 acres of brush the first day and 15,000 by the end of the week.

To prevent such extensive and hazardous forest fires which occur especially in southern California, I suggest that more effort be expended at working with, instead of against, the ecological characteristics of the vegetation. The brush on the San Dimas area is now 9 years old. This is an ideal area to test a controlled burning program as prevention against a major fire in the future. The watersheds have contour trails at 500-foot elevation intervals, and in some areas after the 1960 fire trenches were established at 40- to 90-foot elevation intervals. I propose that each year a band of vegetation on the slopes be burned starting at the tops of the ridges and mountains. In this way the burn of the previous year would act as a fire break for the present year's burn. Since the elevation difference between the top and bottom of the forest is approximately 4000 feet, it would take 8 years to burn the entire area using 500-foot elevation strips. At that time the natural vegetation would be dense enough to start the process again. If at any time during the process a fire is started at the higher elevations it would be prevented from spreading downward by the burned zones below. Fire starting low on the slopes would stop at the previously burned area and would not generate sufficient heat to cross ridges and jump canyons.

Although this controlled burning would involve the risk of some flooding in heavy rain years, it couldn't be as severe as what happened this past winter below whole mountain slopes which had been denuded by fire. Furthermore, the vegetation below and above the burned strip would serve to some extent as a barrier to erosion and flooding.

HENRY HELLMERS
Department of Botany,
Duke University,
Durham, North Carolina 27706

XYY Chromosome: Medical and Legal Aspects

Kennedy McWhirter's discussion of the XYY chromosome and criminal acts (Letters, 6 June) and comments on that discussion by C. B. Goodhart (Letters, 5 Sept.) point up a basic weakness in society's approach to the control of antisocial or criminal behavior. . . .

McWhirter rightly emphasizes that restraints placed upon individuals must be minimal, and that their purpose must be protection, not retribution. But this principle really should apply no matter what the nature or cause of the behavior that society (or the individual himself) is being protected against.

Behavior is generally believed to be determined by a complex of relatively unalterable genetic factors, more easily alterable effects of previous environment, and freely chosen values and objectives. Current judicial processes presuppose that malefactors with congenital defects, those with temporary mental aberrations, and those that have freely chosen to do wrong can be clearly and readily differentiated; that the legal rights of the individual vis-à-vis those of society, and the legal processes required to adjudicate those rights, differ for these different classes of malefactors (and with the age of the malefactor); and finally, that appropriate, different processes are known and available for rehabilitating malefactors of each class.

However, information currently available offers little assurance that the various factors affecting human behavior are sufficiently well understood to permit reliable diagnosis and effective treatment. . . . For example, it seems likely that when reliable diagnostic procedures are available, they will reveal that most malefactors suffer from combinations of all three general types of defects, and hence will require the same basic kind of treatment in the same basic kind of facility for effective rehabilitation. It also seems likely that

← Circle No. 8 on Readers' Service Card

such a facility and its staff would resemble those of present-day medical and educational institutions rather more than those of present-day penal institutions.

The judicial procedure may also turn out to be the same for malefactors of all classes and ages and much like that now used for those judged to be criminally insane. That is, it may concentrate on evaluating the threat to society and determining the minimum amount and duration of restraint necessary to protect society against that threat. Society and the individual would probably be represented by prosecuting and defending attorneys and experts in order to ensure the fullest possible presentation of relevant facts and principles; however, since the objectives would be protection and rehabilitation rather than retribution, the introduction of evidence of specific criminal acts would be primarily for the purpose of determining the threat to society rather than the treatment of the malefactor. Appropriate consideration would be given both to society's right of self-defense and to the "every dog may have his bite" principle. . . .

P. ROGER GILLETTE
Operations Analysis Division,
Stanford Research Institute,
Arlington, Virginia 22209

Although the majority of recent letters on the XYY complement primarily discussed the legal implications connected with this chromosomal anomaly, Kessler and Moos (1 Aug.) referred to pathophysiological associations found with this karyotype. Our findings from research projects covering cytogenetic studies on either sociopaths or diseases related to myotonic dystrophy—which, incidentally, is the only disease which can be sometimes associated with an extra Y chromosome—tend to agree with the views expressed by Kessler and Moos.

The initial concept of the XYY syndrome included the well-known features of tallness, aggressiveness, and genital abnormalities. Now, however, attention is being given to many pathological features which are not consistently associated with an XYY karyotype. In some cases these features are found in other genetic syndromes; in other cases the clinical signs are symptomatically related to diseases of an orthopedic or neurological nature. The number of reports on single cases is still insufficient to detect a consistent clinical sign or dermatoglyphic pattern which could be

used to identify members of the general population by a cytogenetic means.

We believe that more meaningful findings of physical defects will be obtained when extensive cytogenetic studies are performed on a large sampling of patients who possess those pathological features which are already recognized in XYY individuals.

WOLFGANG LEHRNBECHER
GEORGE J. LUCAS
Cytogenetics Unit, Department of Health, Education, and Welfare, St. Elizabeths Hospital, Washington, D.C. 20032

Are, Not Acre

According to my Senator, some progress is being made in the United States Senate toward the passage of legislation which will replace the British system of weights and measures with the metric system. Although we are educating our legislators to the need for this legislation, three recent experiences I have had show that we need to get our scientific house in order: (i) Of 200 students in a general botany course, most of whom had taken a course in chemistry or physics, none of the Americans knew what a degree Celsius was, although all had heard of the degree centigrade. These students represented most of the 50 states. (ii) When I referred to "density of plants per *are*" in a manuscript submitted for publication, my spelling was "corrected" to read *acre* at every review, the last time in galley proof, even after I had defined the are, in parentheses, as (100 m^2). (iii) In an article by a noted ecologist dedicated to the scientists attending the XIth International Botanical Congress, I found reference to a plateau of 26 million *square* hectares (reminiscent of the frequent references one sees of wind velocities in knots per hour).

Perhaps these annoyances are merely the result of confusion in trying to deal with two systems at one time and will disappear when we have adopted the metric system for daily use. A Swedish friend recalled the conversion to the metric system in his country as a time when housewives frequently requested a kilometer of butter or a gram of milk. . . .

LORENTZ PEARSON
Department of Biological Sciences, Ricks College, Rexburg, Idaho 83440