

Allen A. Bartholomew*

PSYCHOPATHY, SEX CHROMOSOME ABNORMALITIES, AND THE CRIMINAL LAW**

Introduction

Whilst it may be that some clinicians use the term psychopathy, or psychopathic personality, in a somewhat precise manner and could offer reasonably clearly understood clinical criteria, it is apparent that in very many cases the term is nearly meaningless except for indicating non-psychotic behavioural disturbances, preferably of long-standing. However, it should be noted that Curran and Mallinson (1944)¹ comment that Brill has expressed the view that "all the psychopathic personalities belong to some psychotic group and should be classified accordingly" and that Cleckley has written in a similar vein. Although there have been many "definitions" of psychopathy² the endeavour to give a statutory definition is of interest and one should give consideration to the formulation set out in the *Mental Health Act*, 1959, of England and Wales:

"a persistent disorder or disability of mind (whether or not including subnormality of intelligence) which results in abnormally aggressive or seriously irresponsible conduct on the part of the patient, and requires or is susceptible to medical treatment"³.

Whether the diagnosis is to be seen as a form of psychosis, neurosis or what has been termed a "personality disorder", it has to be admitted that in some cases the clinical category is little more than a "waste paper basket" and is indicative of little more than the dislike of the clinician toward his patient and the patient's behaviour.

Over the last 137 years, since Pritchard wrote his book in 1835⁴, many different clinical and aetiological categories have been included under the rubric "psychopathy"⁵ so much so that the term is now best seen as representing an "amorphous mass of psychopathic personalities"⁶ or in the same category as "schizophrenia" is simply shorthand for "the schizophrenias"

* Psychiatrist Superintendent, H.M. Prison Pentridge, Melbourne; Department of Psychiatry, University of Melbourne.

** This article is based in part on a paper read to the 5th Congress of the World Psychiatric Association held in Mexico City on 2nd December, 1971.

1. D. Curran and P. Mallinson, "Psychopathic Personality" in *Recent Progress in Psychiatry* (ed. G.W.T.H. Fleming, J. & A. Churchill Ltd., London, 1944), 266 at 268.
2. See M. Craft, "Psychopathic Personalities: A Review of Diagnosis, Aetiology, Prognosis and Treatment" (1961) 1 *Brit. J. Criminol.* 237; also R. D. Hare, "Psychopathic Behaviour: A Bibliography" (1967) 7 *Excerpta Criminologica* 365.
3. *Mental Health Act*, 1959, 7 & 8 Eliz.2. c.72. See Havard J.D.J. "The Mental Health Act and the Criminal Offender" (1961) *Crim. L.R.* 296.
4. Pritchard J.C., *A Treatise on Insanity and Other Disorders Affecting the Mind* (Sherwood, Gilbert, and Piper. London, 1835).
5. R. Thompson, "Psychopathic Personality" (1958) 1 *Brit. Med. J.* 402.
6. A. A. Bartholomew, "The Extra Y Chromosome and Criminal Behaviour" (1968) 2 *Aust. N.Z. J. Psychiat.* 6.

(Bleuler, 1950)⁷ and "alcoholism" is shorthand for "the alcoholisms" (Bartholomew, 1967)⁸. It may well be that more careful clinical investigation would eliminate some of the more alien diagnostic groups (Winzie, 1962)⁹, but in the final analysis, for a more meaningful breakup of psychopathy, we need well validated and reliable objective criteria. An attempt has been made to relate psychopathy to two personality variables, neuroticism and extraversion¹⁰, and this may prove of some possible value. However, one aspect of this paper is concerned with another investigation: an investigation concerned with the sex chromosomes which may ultimately offer a valuable objective criterion, and perhaps impart some aetiological insights into at least some cases of psychopathy.

It should be recognized that the problem of sex chromosome abnormality, and its relation to psychopathy, is not only of academic interest. The whole question is relevant to the administration of justice. Two matters appear of immediate concern¹¹. Firstly, is the presence of a sex chromosome abnormality of any significance in relation to the issue of criminal responsibility (variously defined)? It has been suggested that the extra Y chromosome is "the criminal chromosome"¹² and that the finding of such an additional chromosome should totally modify our traditional thinking on the subject of criminal responsibility. The second matter relates to the sentencing and paroling of convicted offenders. However, before the forensic problems may be properly debated in an informed manner it is necessary to give an account of the commonly found correlations between mental state and some of the sex chromosome variations.

History of the Correlation of Sex Chromosome Abnormality and Psychopathy

The majority of the work done with regard to the sex chromosome abnormalities and mental state has been done with men. In general terms workers are concerned with three types of male sex chromosome abnormality:

- (a) The multiple X syndrome (Klinefelter's syndrome),
- (b) The double Y syndrome, and
- (c) (Possibly) the large Y syndrome.

7. E. Bleuler, *Dementia Praecox or the Group of Schizophrenias* (Trans. J. Zinkin. International Universities Press, New York).

8. A. A. Bartholomew, "Some Research Problems with the Alcoholic and Drug Dependent Prisoner" (1967) 1 Aust. N.Z. J. Psychiat. 86.

9. G. B. Winzie, "The Structure of Psychopathy: An account of the Contributions to the Literature on Psychopathy of Ben Karpman, M.D." (1962) 5 Arch. Crim. Psychodyn. (Memorial Issue) 127.

10. The work relating to these two dimensions has been largely carried out at the Institute of Psychiatry, Maudsley Hospital, University of London, by Professor H. J. Eysenck and his colleagues and students. The results have been published in a whole series of books and papers.

11. J. E. Hall Williams, "Chromosome Abnormality and Legal Accountability" in *Criminological Implications of Chromosome Abnormalities* (ed. D. J. West. University of Cambridge, Institute of Criminology) 100.

12. W. M. Court Brown, W. H. Price and P. A. Jacobs "The XYY Male" (1968) 4 Brit. med. J. 513. (1968a).

(A) THE MULTIPLE X SYNDROME

The commonest form, 47,XXY, occurs in about 1.3 cases per 1,000 male live births¹³ whilst other related conditions are recognized rather more rarely, e.g., 48,XXYY and mosaics 46,XY/47,XXY. In 1957 Pasqualini¹⁴ stressed the impaired and peculiar intellectual functioning of patients with Klinefelter's syndrome and the presence of psychopathic traits in some of them. Hunter (1968)¹⁵ demonstrated that chromatin positive men (males with more than one X sex chromosome) "showed them to be inadequate and rather aggressive psychopathic personalities". He also commented¹⁶ that "compared with a large control hospital group the incidence of aggressive acts is greatly increased" whilst in 1969 he wrote¹⁷ that he considered 14 of 15 cases of Klinefelter's syndrome were abnormal personalities best described as "predominantly inadequate or passive psychopaths". This tends to agree with the evidence of an increased incidence of the syndrome in Special Hospitals, the observations of Forssman and Lambert (1963)¹⁸, and the "psychopathic type of distribution of their I.Q. sub-tests" (Hunter, 1969)¹⁹. Further evidence for the alleged correlation between the multiple X syndrome and psychopathy comes from Burnand et al. (1967)²⁰ who write:

"the findings . . . support the . . . interpretation that the Klinefelter's subjects were of a more 'acting out', 'delinquent' or 'psychopathic' personality than their controls.

Responses to the Porteus Maze Test, Rorschach and Word Association Test tended to show Klinefelter males to be of psychopathic type of personality with difficulties concerning aggressive impulses . . . differences were also seen in response to sexual stimuli. These differences suggest that defensive and inferiority feelings about sex matters have greater importance with Klinefelter patients than with other subnormality unit patients".

(B) THE DOUBLE Y SYNDROME

Perhaps no one sex chromosome abnormality has received so much attention by both professional workers and the general public. Indeed, as has already been noted, the extra Y chromosome has even been dubbed the "criminal chromosome"²¹. Although many features have been associated with

-
13. G. R. Sutherland, "Chromosome Abnormalities in Newborn Babies" (1970) 1 Aust. J. Ment. Retard. 77.
 14. R. Q. Pasqualini, G. Vidal and G. E. Bur, "Psychopathology of Klinefelter's Syndrome" (1957) 2 Lancet 164.
 15. H. Hunter, "Klinefelter's Syndrome and Delinquency" (1968) 8 Brit. J. Criminol. 203.
 16. *Ibid.*
 17. H. Hunter, "A Controlled Study of the Psychopathology and Physical Measurements of Klinefelter's Syndrome" (1969) 115 Brit. J. Psychiat. 443.
 18. H. Forssman and G. Lambert, "Incidence of Klinefelter's Syndrome Among Mental Patients" (1963) 1 Lancet 1327.
 19. Hunter, *supra* n.17.
 20. G. Burnand, H. Hunter and K. Hoggart, "Some Psychological Test Characteristics of Klinefelter's Syndrome" 1967) 113 Brit. J. Psychiat. 1091.
 21. For example, a headline in The Australian of 10th October, 1968, read "Not guilty for killer with criminal trait".

this syndrome²² the best known triad are (a) increased height; (b) a minor to moderate degree of mental retardation; and (c) criminal propensities²³. These criminal propensities may best be seen as an aspect of psychopathy. Hope et al. (1967)²⁴ have suggested that

"There were very few significant differences between mean scores of the two groups (double Y and controls) on psychological tests. There were, however, differences in the inter-relations of tests. There was a marked discrepancy between the two groups in the effect of response set (defensiveness) in replies to questionnaires. A difference in the structure of aggression or hostility was also detected."

Nielsen (1968a)²⁵ commented regarding his three patients:

"There were similarities more than differences in the three patients' personality disorder with aggressivity, lack of control of impulses, contact difficulties, a certain immaturity, character weakness, lack of ability for normal sexual and emotional relations with women together with a normal or increased sexual libido leading to kleptomania in the first patient, aggressive behaviour and sexual relations with a fourteen-year-old girl in the second patient, and exhibitionism and arson in the third."

As a final comment concerning the possible correlation between the double Y abnormality and psychopathy one may quote from Griffiths (1971a)²⁶:

"Of the many disparate abnormal manifestations of the condition, probably the most constant are increased stature, asocial and introverted mental attitudes, impaired intelligence and a disposition to psychopathic mental illness."

(C) THE LARGE Y SYNDROME

This is an area of considerable uncertainty as a number of cytogeneticists are unconvinced as to the existence of this entity. Nielsen (1968b)²⁷ writes in such a manner that one may be persuaded that his evidence is virtually beyond contradiction, e.g., "The mean Y/F ratio . . . was 0.96 with standard deviation 0.06"²⁸, but others maintain that using present techniques of measurement intra-person variation can be greater than this. However, of importance

22. See H. A. Hienz, "YY-Syndrome Forms" (1969) 1 *Lancet* 155.

23. G. R. Sutherland, S. Wiener, A. A. Bartholomew and M. G. Ferguson "XYY Males in Victoria" (1972) 1 *Med. J. Aust.* 1249, have cast some doubt regarding the justice of this claim.

24. K. Hope, A. E. Philip and J. M. Loughran, "Psychological Characteristics Associated with XYY Sex-Chromosome Complement in a State Mental Hospital" (1967) 113 *Brit. J. Psychiat.* 495.

25. Nielsen J. "The XYY Syndrome in a Mental Hospital" (1968) 8 *Brit. J. Criminol.* 186. (1968a)

26. A. W. Griffiths, "The XYY Anomaly" (1971) 11 *Med. Sci. Law* 73.

27. Nielsen J. "Y Chromosomes in Male Psychiatric Patients above 180 cm. Tall," (1968) 114 *Brit. J. Psychiat.* 1589. (1968b)

28. Nielsen (*ibid*) writes "Measurements were made of the Y chromosome and the chromosomes of the F and G groups . . . the mean length of the Y chromosome was compared with the mean length of the F chromosomes . . . we have found that the Y/F ratio was the easiest and most reliable index of the relative size of the Y chromosome".

to the present discussion is the comment of Nielsen²⁹ that "a relation between large Y and symptoms of character disorder, alcoholism and criminality has been found (p (Fisher) = 0.003)"³⁰. In another paper (Nielsen and Tsuboi, 1970)³¹ one reads:

"(The) findings indicate that males with two Y chromosomes and probably also males with a large Y chromosome, have a higher disposition to tall stature, character disorder and criminality than is found in the general population. There might be a Y linked inheritance of tall stature, character disorder and criminality irrespective of the size of the Y chromosomes . . . We found a higher frequency of patients with character disorder and criminality in patients with a stature of 181 cm. plus than in patients with a stature below 181 cm."

Although a sample of the literature has been considered in an endeavour to demonstrate a possible positive and significant correlation between sex chromosome abnormality and psychopathy, it is essential that the word correlation be emphasised and not replaced by any notion of cause and inevitability. Court Brown et al. (1968a)³² write:

"the only conclusion that can be reached at present about a male with an extra Y chromosome is that, by comparison with an XY male, he incurs some increased risk of developing a psychopathic personality . . . There is, however, no evidence which indicates that an XYY male is inexorably bound to develop anti-social and criminal traits."

That all double Y males do not become anti-social, or even psychopathic, is apparent from the case published by Wiener and Sutherland (1968)³³ and the recent researches published by Sutherland et al. (1972)³⁴; and that all "psychopaths" do not have sex chromosome abnormalities is seen from the survey conducted by Masterson et al. (1970)³⁵.

(D) SEX CHROMOSOME ABNORMALITIES IN FEMALES

The position with women having an additional X chromosome is somewhat uncertain. The incidence of this condition is 1.0 per 1,000 females³⁶ and three cases found in a mental deficiency hospital have been described by

29. Nielsen (*ibid*).

30. Nielsen (*ibid*). p values indicate probability and $p = 0.003$ means that there are 3 chances in 1,000 that the association could arise by chance so that in this case the relationship between chromosome size and "psychopathy" is highly statistically significant.

31. Nielsen J. and T. Tsuboi, "Correlation Between Stature, Character Disorder and Criminality" (1970) 116 *Brit J. Psychiat.* 145.

32. Court Brown et al. (1968a).

33. S. Wiener and G. R. Sutherland, "A Normal XYY Man" (1968) 2 *Lancet* 1352.

34. Sutherland et al. (1972).

35. J. Masterton, E. O'Brien and M. Power, "Cytogenetic Studies in a Maximum Security Hospital" (1970) 63 *J. Irish Med. Ass.* 362. In one case "An unusually large Y chromosome was present" but otherwise no sex chromosome abnormalities were noted.

36. G. R. Sutherland, (1970).

Johnston et al. (1961)³⁷ and all three cases were quite severely mentally retarded. Forssman (1970)³⁸ contents himself with the comment that

“females with the extra X chromosomes are also more liable to mental disease than are females in the general population . . . Several of Olanders’ triple-X females have had trouble in adjusting.”

Our Present Findings³⁹

We have now examined 286 males in the main multi-purpose prison for the State of Victoria, but not on a random basis. Initially we examined prisoners who were “tall”, we then examined prisoners considered “psychopathic”, then we examined a number of prisoners who were considered “alcoholic” and finally we examined prisoners convicted of aggressive offences. This prison population of 286 males produced 12 men who were found to have sex chromosome abnormalities⁴⁰, an incidence of 4.2 per cent^{40a}. Further, we have examined the inmates of two security wards, one for the mentally ill (Sutherland and Bartholomew, 1970)⁴¹ and one for the mentally defective (Sutherland and Bartholomew, 1971)⁴². In the former ward were found two cases of sex chromosome abnormality⁴³ in a population of 55 whilst

Prison (N = 286)	47,XYY (5 cases)	6 cases
	47,XYY + autosomal abn.	
	47,XXY (5 cases)	6 cases
	47,XXY/46,XY	
Ward for mentally ill (N = 55)	47,XYY (2 cases)	2 cases
Ward for defectives (N = 38)	47,XXY	
	48,XXYY	
	46,XX (Male)*	3 cases
	TOTAL	17 cases

Table 1. Setting out the cases found in three institutions with sex chromosome abnormalities.

* G. R. Sutherland, S. Wiener, and A. A. Bartholomew, “A Male with Karyotype 46,XX”. (1972) 15, *Ann. Genet.* 187.

37. A. W. Johnston, M. A. Ferguson-Smith, S. D. Handmaker, H. W. Jones and G. S. Jones, “The Triple-X Syndrome” (1961) 2 *Brit. Med. J.* 1046.
38. H. Forssman, “The Mental Implications of Sex Chromosome Aberrations” (1970) 117 *Brit. J. Psychiat.* 353.
39. The findings presented here are the research results of Dr. Saul Wiener and Mr. Grant Sutherland of the Cytogenetics laboratory, St. Nicholas Hospital, Melbourne, and the present author.
40. In Case No. 1 in this series the prisoner had an additional autosomal abnormality (Dp+): see S. Wiener, G. R. Sutherland and A. A. Bartholomew “A Murderer with 47,XYY and an Additional Autosomal Abnormality” (1969) 2 *Aust. N.Z. J. Criminol.* 20. A further prisoner was found to have a similar autosomal abnormality, but this is not further commented upon in this paper.
- 40a. In a selected sample a further two cases of 47,XYY have been identified in the prison population out of three cases investigated; see A. A. Bartholomew and J. Harvey, “XYY Males in Victoria: Two Further Examples” (Correspondence) (1972) *Med. J. Aust.* ii 908.
41. G. R. Sutherland and A. A. Bartholomew, “Chromosome Survey in a Security Ward: Total Ascertainment” (1970) 3 *Aust. N.Z. J. Criminol.* 99.
42. G. R. Sutherland and A. A. Bartholomew “Chromosome Survey in a Mental Deficiency Security Ward: Total Ascertainment” (1971) 4 *Aust. N.Z. J. Criminol.* 82.
43. A further case was found to have an autosomal abnormality, 16q+.

Case No.	1	2	3	4	5	6	7	8	9	10	11	12
Sex Chromosomes	XYY ¹	XYY	XYY	XYY	XYY	XYY	XXY/XY	XXY	XXY	XXY	XXY	XXY
Age in years	45	22	34	53	39	17	37	21	42	31	22	19
Height in inches	70	70	82.5	71.5	73.5	71	64.5	69	71	69	68.5	71
Offence when seen	Murder	Murder ²	Att. murder	Larceny	Larceny	Buggery	Gross indecency	Shop Brk. Mal.dam. Resist arrest with firearm	Buggery	Arson	Stealing drugs from chemist	Larceny
I.Q. (Full scale WAIS)	94	71	101	84 ³	65	85	105	75	98	95	94	84
Previous imprisonments	Several	None	Very many	Very many	Several	None	None	Two	None	One	One	None
MPI ⁴ E/N	21/12	18/10	22/6	14/14	12/9	—	10/15	15/8	13/12	7/19	14/10	9/8
Alcoholic or drug dependent	+	—	—	+	—	—	+	+	+	+	+	—

1. Plus a further autosomal abnormality.
2. Found not guilty on the ground of insanity.
3. An unreliable figure: the prisoner tested quite differently at different times.
4. Maudsley Personality Inventory—Extraversion/Introversion.

Table 2A. Data regarding the 12 prisoners found with sex chromosome abnormalities.

* Sutherland, G. R., Wiener, S. and Bartholomew, A. A., "A Male with Karotype 46,XX". (1972) 15, Ann. Génét. 187.

Case No.	13 (Mentally ill, security ward)	14 (Mentally ill, security ward)	15 (Mentally defective, security ward)	16 (Mentally defective, security ward)	17* (Mentally defective, security ward)
Sex chromosomes	XYY	XYY	XXY	XXYY	XX (Male)
Age in years	25	42	55	35	19
Clinical diagnosis	Schizophrenic	Psychopath Dullard	Defective	Defective	Defective
Height in inches	78	78	68	73	68
Intelligence	88 Full scale WAIS	"Dull"	R2 (IQ = 36-51)	R1 (IQ = 52-67)	R1 (IQ = 52-67)
Criminal record	None	A number of property offences	None	None but a history of sexual dev.	None but a history of minor delinquency
Age of patient when first hospitalized	14 yrs	31 yrs	52 yrs	14 yrs	Uncertain
Age of patient at start of present hospitalization	21 yrs	34 yrs	52 yrs	31 yrs	19 yrs

Table 2B. Data regarding the five patients found with sex chromosome abnormalities.

* See Sutherland, Wiener, and Bartholomew, *supra* Table 1.

in the latter ward three cases of sex chromosome abnormality were found in a population of 38⁴⁴.

Table 1 sets out the sex chromosome findings in the three different populations. These findings may be summarised as there being eight cases of the double Y chromosome constitution^{44a} and nine cases of Klinefelter's syndrome. Tables 2A and 2B set out the various findings in the 17 cases.

The diagnosis made in the 17 men with sex chromosome abnormalities was:

	Cases
Psychopathic personality	12 ⁴⁵
Psychopathic personality, plus intellectual dullness	3
Mental deficiency	1
Schizophrenia	1

In the prisoner population of 286, the diagnosis was frequently difficult to make and had to be made with limited information and time. However, the clinical diagnosis made for the 286 prisoners was:

	Cases
Psychotic	37
Brain damaged	28
Mental retardation	16
Psychopathic	78
Neurotic	50
"Normal"	77

All 12 cases of sex chromosome abnormality seen in the prison were diagnosed as psychopathic, often being also described as intellectually dull or retarded. On the basis that 12 of 78 cases of psychopathy had a sex chromosome abnormality (15.4 per cent), these findings must be seen as of interest. But, as stated earlier, this sample was not random so that no claim is being made in terms of the particular statistic calculated: other than that all our 12 cases of chromosome abnormality were diagnosed as psychopaths.

One may next note the alcohol and drug taking history of those prisoners consider "alcoholic" or drug dependent and who had a sex chromosome abnormality. Alcoholism and drug dependence are often thought of as a symptom of psychopathy in very many cases and Nielsen⁴⁶, as already noted, writes of the relation between the large Y chromosome and character disorder, alcoholism and criminality. The findings are set out as Table 3. The outstanding feature is early teenage for the start of regular, and often heavy, drinking, five of the seven having a history of alcoholic (or drug) psychosis, and all had been in clinics or hospitals for their drinking and/or drug taking problems. In other words the seven with the sex chromosome abnormalities impress as

44. A further case was noted of an autosomal abnormality, a Down's syndrome.

44a. See n.40a *supra*.

45. Case 3 of this paper has been comprehensively set out and published: A. M. Marcus and G. Richmond, "The XYY Syndrome: A Short Review. A Case Study and Investigatory Model" (1970) 15 J. Forensic Sciences 154. In this present series the prisoner is considered a psychopathic personality.

46. Nielsen J. (1968b).

Case number	1	4	7	8	9	10	11
Age started drinking	16	15	18	17	14	14	13
History of alcoholic psychosis	+	-	+	+	+	+	-
Attendance at hospital or clinic for drug dependency or alcoholism	+	+	+	+	+	+	+
Drugs taken (a) Meth. S.	+	+	+	+	-	+	-
(b) Amphet.	-	-	+	+	-	-	+
(c) Other	+	-	+	+	-	+	+
Sex orientation	D	N	H	H	H	H	N
Diagnosis	P	P	P	P	P	P ¹	P

1. Although considered by many psychiatrists to be a psychopath he did demonstrate much anxiety and depression (neurotic).

Meth. S. = Methylated Spirit

Amphet. = Amphetamines

D = Deviant in other than simple homosexual behaviour

N = "Normal"

H = Homosexual

Table 3. Setting out the data regarding drinking alcohol and/or taking drugs by those prisoners considered as alcoholics or drug dependent persons who had some abnormality of their sex chromosomes.

being more "severe" than is the case with the general run of such persons found in a prison. Another finding of interest is that of the 286 prisoners investigated, 192 were considered alcoholic or drug dependent, 67 per cent⁴⁷. This group of 192 prisoners were divided into two groups:

1. "Non-serious offenders" who were convicted of such offences as drunk and disorderliness, vagrancy, etc., and
2. "Serious offenders" who were men sentenced to a period of three months or more imprisonment and who therefore tended to have committed the rather more serious offences. Table 4 sets out the findings for the group of 192 prisoners and demonstrates that all the cases but one of those with sex chromosome abnormalities fall into the "serious" category; the single exception at present bidding fair to join shortly the "serious".

This indicates that the "simple" alcoholic, the man tending to form part of the army of vagrants and drunks, do not demonstrate sex chromosome abnormalities as compared with the individual diagnosed as an alcoholic and who is convicted of some serious offence. This might be taken as suggesting that the more inadequate personality (psychopath) is less likely to have a sex chromosome abnormality as against the man with the more aggressive personality disorder.

Earlier a comment was made regarding the dimensional theory of Eysenck⁴⁸ and its possible relevance to the diagnosis and understanding of the aetiology

47. A. A. Bartholomew, "Alcoholism and Crime" (1968) 1 Aust. N.Z. J. Criminol. 70.

48. See n.10.

	N	Double Y	Multiple X	Both
"Non-serious"	68	—	1 (1.5%)	1 (1.5%)
"Serious"	124	2 (1.6%)	4 (3.2%)	6 (4.8%)
Total	192	2 (1.0%)	5 (2.6%)	7 (3.6%)

Table 4. Setting out the karyotypes for the two different alcoholic and/or drug dependent populations in terms of frequency and percentages.

Population	Extraversion	Neuroticism
Eysenck		
XYY (N = 10)	9.40 SD = 3.53	12.2 SD = 5.65
Control (N = 603)	12.75 SD = 3.52	11.04 SD = 4.75
Bartholomew (1963)		
Prisoner population (N = 150)	15.86 SD = 3.78	15.25 SD = 4.68
Present research		
XYY (N = 5)	17.40 SD = 3.87	10.20 SD = 2.72
Multiple X (N = 6)	11.33 SD = 2.98	12.00 SD = 3.95

Table 5. Setting out the findings regarding Extraversion and Neuroticism in cases of double Y and multiple X compared with some other populations.

of psychopathy. Psychological testing of a population such as has been investigated here is difficult, and verbal tests give doubtful results, whilst the more clearly mentally defective cannot even begin to cope with a questionnaire such as the Maudsley (or Eysenck) Personality Inventory⁴⁹; an inventory consisting of a number of questions to be answered "Yes", "No", or "?". Such results as we have do appear to indicate that in both the double Y and multiple X cases there is a not dissimilar neuroticism score which is below previously ascertained means for male prisoners (Bartholomew, 1963)⁵⁰. It is also apparent that the double Y cases have an extraversion score close to the prisoner norms, whereas the multiple X cases tend to be "introverted" being some one standard deviation from the prisoner mean or, if one assumes a normal distribution, then such persons tend to be in the most "introverted" sixteen per cent of the prison population. The findings are set out as Table 5. Here it is of interest to note the comments of Griffiths (1971a)⁵¹ in the light of these findings. He found with his men with a double Y chromosome constitution that "there is a tendency towards introverted and asocial mental attitudes reflected in (their) life histories". Table 5 also gives the findings of Eysenck and Eysenck (1972)⁵² for the personality dimensions extraversion and neuroticism in the available 10 cases (out of 12) of Griffiths' research⁵³.

49. A personality inventory produced at the Maudsley Hospital by Professor Eysenck and his co-workers.

50. A. A. Bartholomew, "Some Comparative Australian Data for the Maudsley Personality Inventory" (1963) 15 *Aust. J. Psychol.* 46.

51. A. W. Griffiths, (1971a).

52. H. J. Eysenck and S. B. G. Eysenck, "Prisoners of XYY Constitution" (1972) 120 *Brit. J. Psychiat.* 124.

53. A. W. Griffiths, "Prisoners of XYY Constitution: Psychological Aspects" (1971) 119 *Brit. J. Psychiat.* 193. (1971b).

It might be worthwhile investigating how the individual with a sex chromosome abnormality compares with his chromosomally normal counterpart in various conditioning experiments, and possibly relate such findings to an understanding of the aetiology of the psychopathic condition.

Hambert (1964)⁵⁴, when writing of Klinefelter's syndrome, wrote that "the patients' difficulty in adjusting is of the same nature as what child psychiatrists often call the minimum brain damage syndrome" and more recently Forssman (1970)⁵⁵ writes that his favourite hypothesis "is that the mental troubles stem from cerebral dysfunction". He continued:

"Thus, according to my hypothesis, the gonosomal aberrations are associated with cerebral dysfunction, whether it be of structural, neurochemical or neurophysiological nature, though these are actually only different facets of the same phenomenon."

If this thesis be valid, then one may comment that it has been suggested (Eysenck, 1957⁵⁶; Franks, 1960⁵⁷) that "brain damage produces in general a tendency towards a more extraverted behaviour pattern" and difficulty in learning in terms of classical conditioning experiments

What must be clearly stated at this point is that one may not equate sex chromosome abnormality with some meaningful degree of psychopathic personality. With regard to the double Y constitution the cases described by Wiener and Sutherland (1968)⁵⁸ and Court Brown et al. (1968b)⁵⁹ clearly indicate that "normal" persons may be found with such abnormalities. However, it is perhaps reasonable at this time to suggest that having a sex chromosome abnormality will increase the likelihood of having a psychopathic personality of some degree of severity. It is further suggested that to date the research in terms of sex chromosome abnormalities is of some importance in beginning to delineate the vexed questions posed by the clinical category of psychopathic personality. It is not proposed that a sex chromosome abnormality is to be expected to underlie all, or even most, diagnoses of psychopathy but simply that in a number of cases, perhaps as high as five per cent., particularly if the population be both somewhat taller than average and slightly mentally dull, such an abnormality will be found. Again, one might well look at the "psychopaths" who, in the words of Court Brown (1968)⁶⁰ are "drawn from all the social classes" and stand "out as the black sheep of their families and

54. G. Hambert, "Psychiatric Symptoms at Males with Chromatin-Positive Klinefelter Syndrome—Personality and Neuropsychiatric Complications" (1964) 40 *Acta Psychiatrica Scandinavica*, suppl.180, 101.

55. H. Forssman, (1970).

56. H. J. Eysenck, *The Dynamics of Anxiety and Hysteria* (Routledge & Kegan Paul, London, 1957), 33; also H. J. Eysenck, *Crime and Personality* (Routledge & Kegan Paul, London, 1964), 53, 79.

57. C. M. Franks, "Conditioning and Abnormal Behaviour" in *Handbook of Abnormal Psychology* (ed. H. J. Eysenck. Pitman Publishing Co. Ltd. London, 1960), 457 at 465.

58. S. Wiener and G. R. Sutherland, (1968).

59. W. M. Court Brown, W. H. Price and P. A. Jacobs, "Further Information on the Identity of 47,XYY Males" (1968) 2 *Brit. Med. J.* 325. (1968b).

60. W. M. Court Brown, "Males with an XYY Sex Chromosome Complement". (1968) 5 *J. Med. Genet.* 341.

as the apparently inexplicably erring sons in otherwise reasonably well adjusted families". Whilst in our present stage it would be unreasonable to karyotype (mapping of the chromosomes) all cases diagnosed as psychopathic⁶¹ it would be well worthwhile clinically examining a patient rather more thoroughly than is often done, noting features such as height, testicular size, mental retardation, and other somatic findings⁶².

Another matter worth mentioning is the rather remarkable incidence of arson committed by those with sex chromosome abnormalities, both reported in the literature⁶³ and found in this investigation. In this series it was found that nine of the 17 cases of sex chromosome abnormality had a history of committing arson—in some cases the setting fire was involved in a charge of malicious damage and the offender was not charged with the crime of arson. Nielson (1970)⁶⁴ found a figure of 27 per cent. for arson in his cases of the double Y syndrome and seven per cent. for his cases of Klinefelter's syndrome. It is suggested that these figures, and the figure of 53 per cent. from this investigation, might properly cause one to karyotype those cases of fire-lighting illegally which had some of the other well recognised features of a sex chromosome abnormality.

It may well be that Karpman⁶⁵ was correct in suggesting that there is a large "symptomatic" or "secondary" group of psychopaths who, in fact, suffer from other non-diagnosed illnesses, and a small primary or "idiopathic" group of psychopaths whom he christened "anethopaths". It is not impossible that the sex chromosome abnormalities correlate quite highly with the anethopathy; or they may be seen as a sub-group of anethopathy. At this stage one in no way excludes the factor of nurture in the aetiology of psychopathy, or anethopathy, so that it is likely that a sex chromosome abnormality would only be found in a percentage of anethopaths and that some "normal" persons would be found with sex chromosome abnormalities.

Sex Chromosome Abnormalities and the Forensic Field

The problem of sex chromosome abnormality and its relationship to "psychopathy" is not only of academic interest or of exclusive concern to the psychiatrist. It is relevant to those concerned with the administration of justice. Two matters appear to be of immediate interest. The first matter is whether or not the presence of a sex chromosome abnormality has any significance in relation to the issue of criminal responsibility, variously defined. As has already been noted, it has been suggested that the extra Y chromosome is "the criminal

61. It might well be that direct staining techniques will permit of more extensive research regarding the Y chromosome—techniques such as fluorescent staining with quinacrine and examination under ultra-violet light; see P. E. Poloni and D. E. Mutton, (1971) *Brit. Med. J.* 138.

62. See n.22.

63. See, for example, D. J. Bartlett, W. P. Hurley, C. R. Brand and E. W. Poole, "Chromosomes of Male Patients in a Security Prison" (1968) 219 *Nature* (London) 351; B. Noel, B. Quack, Y. Durand and M. O. Rethore "Les Hommes 47, XYY" (1969) 12 *Annales de Génétique* 223.

64. Nielsen J. (1970) "Criminality Among Patients with Klinefelter's Syndrome and the XYY Syndrome" (1970) 117 *Brit. J. Psychiat.* 365.

65. See n. 9.

chromosome" and that an appreciation of this fact must totally modify our traditional thinking on the subject of legal responsibility. One might well enlarge this proposition to include all sex chromosome abnormalities. Nielsen (1970)⁶⁶ has suggested that "persons who commit crimes and are found to be *genetically disposed* (author's italics) to criminality should receive psychiatric treatment". The second matter relates to the manner in which convicted persons are dealt with by the courts and the manner in which men serving sentences of imprisonment are dealt with by Parole Boards. Should the presence of a sex chromosome abnormality, in the absence of any gross psychiatric disability, play any part in determining the sentence to be imposed by the court? And should the presence of a sex chromosome abnormality, in an essentially clinically "normal" person influence the decision of a Parole Board?

(A) RESPONSIBILITY

The M'Naughten Rules, which are still used in the three common law States in Australia, demand that for a person to be found legally irresponsible for his alleged acts two features are necessary: (1) the individual should have suffered at the relevant time from a disease of the mind, and (2) the disease of the mind should have produced a defect of reason such that there was a lack of knowledge of the nature and quality of the act, or of the fact that the act was wrong⁶⁷. The Code States have somewhat different legislation in that there are two additional features which enlarge the scope of the notion of legal irresponsibility—"natural mental infirmity"⁶⁸ and the words "capacity to control his actions"⁶⁹. However, we may consider legal responsibility in its most general terms⁷⁰ and state baldly that the simple presence of a sex chromosome abnormality is irrelevant to this issue. In the first place a sex chromosome abnormality does not inevitably produce any psychiatric abnormality⁷¹ and, clearly, in the absence of any psychiatric disturbance the issue of legal irresponsibility does not arise. The two features which do appear to correlate with sex chromosome abnormality are (1) intellectual dullness and (2) psychopathy.

The intellectual dullness for the most part is not gross in those found to be 47,XYY or 47,XXY and would not normally produce a mental state consistent with the notion of legal irresponsibility. However, in the three cases of Klinefelter's syndrome of this series found in a mental deficiency security ward (Cases 15, 16 and 17), at least Case 15 would have been considered legally irresponsible—indeed, found unfit to plead and stand his trial—and the other two cases would be borderline regarding responsibility.

66. Nielsen J. (1970).

67. In *Stapleton v. R.* (1952) 86 C.L.R. 358 knowledge of wrong was expressed as: "the accused's criminal responsibility depends on his ability to reason about the wrongness of his act with a moderate degree of sense and composure, not merely on his appreciation of its illegality".

68. This includes mental retardation. The problem of mental retardation in the common law is not fully resolved, see Report of the Royal Commission on Capital Punishment, 1949-1953, 119, para. 344.

69. Queensland Criminal Code, s.27.

70. In practice there is not likely to be very much difference between Code and common law jurisdictions.

71. S. Wiener and G. R. Sutherland, (1968).

The correlation between sex chromosome abnormality and psychopathy has already been set out. However, it is generally recognised that psychopathy is of various degrees of severity such that a continuum may be accepted with the two poles being "normality" and "gross psychopathy". It is apparent that if "psychopathy" should be considered a state of disease of the mind then only the most gross cases should be acceptable for the purposes of achieving a finding of legal irresponsibility. In fact, psychopathy is not generally accepted as a disease of the mind, even in England⁷², and in the Australian case of *R. v. Willgoss*⁷³, where there was evidence the defendant was a psychopath, an unsuccessful endeavour was made to bring him within the ambit of the M'Naughten Rules. The issue turned on whether the concept of "knowledge", or "knowing" included affective as well as cognitive features. Dixon C.J. expressed his understanding of the evidence for the defence in the following words⁷⁴:

"to make up knowledge of right and wrong the capacity to appreciate or "feel" the effect of his actions upon others and perhaps himself must exist in some degree and this, according to the psychiatrists, was deficient in a gross psychopath. Dr. Sinclair clearly distinguished between what in his terminology is the intellectual process which contributes to knowing, that is to say the application of intelligence, and what he called the appropriate feeling about an act. Without the latter he would say that the man was incapable of knowing that what he was doing was wrong."

It was held that such a proposition "is an attempt to refine upon what amounts to knowledge of the wrongness of the act which is not countenanced by the law"⁷⁵.

The notion of uncontrollable or irresistible impulse is a difficult matter for psychiatrists to comment upon as it is probably impossible to distinguish between "irresistible" and not resisted impulses. One may well ask how anybody, including psychiatrists, can answer sensibly a question properly posed by s.77a of the South Australian Criminal Law Consolidation Act, 1935-1971: whether a person found guilty of certain types of sexual behaviour is psychiatrically ill in that "his mental condition is such that he is incapable of exercising proper control over his sexual instincts". A similar type of problem is posed by the Alcoholics and Drug-dependent Persons Act, 1968, of the State of Victoria where the definition of a drug-dependent person is stated to be "a person who habitually uses drugs of addiction to such an extent that he has lost the power of self-control with respect to the use of drugs of addiction". It has already been noted that the Code States use terms such as "capacity to control his actions"⁷⁶ which would permit a defence of irresistible impulse providing

72. In the English Mental Health Act, 1959, s.4(1), mental disorder is defined as "mental illness, arrested or incomplete development of the mind, psychopathic disorder, and any other disorder or disability of mind" (Havard J.D.J. *supra* n.3).

73. *Willgoss v. R.* (1960) 105 C.L.R. 295.

74. *Willgoss v. R.* (1960) 105 C.L.R. at 300.

75. *Willgoss v. R.* (1960) 105 C.L.R. at 301.

76. Queensland Criminal Code, s.27.

77. S.27.

such an impulse was accepted as a symptom of a "mental disease or natural mental infirmity"⁷⁷. This point of view has been endorsed for the common law States in *Attorney-General for South Australia v. Brown*⁷⁸ when it was stated:

"It may be true enough that although a prisoner has acted in the commission of the acts with which he is charged under uncontrollable impulse, a jury may nevertheless think that he knew the nature and quality of his act and that it was wrong and therefore convict him. But to treat his domination by an uncontrollable impulse as reason for a conclusion against his defence of insanity is quite erroneous. On the contrary, it may afford strong ground for the inference that a prisoner was labouring under such a defect of reason from disease of the mind as not to know that he was doing what was wrong. The law has nothing to say against the view that the mind is indivisible and that such a symptom of derangement as action under uncontrollable impulse may be inconsistent with an adequate capacity at the time to comprehend the wrongness of the act."

Barry and Paton⁷⁹ take the matter rather further. After noting the words of Dixon J. in *R. v. Porter*⁸⁰ that "If through the disordered condition of the mind he could not reason about the matter with a moderate degree of sense and composure it may be said that he could not know that what he was doing was wrong" the authors comment: "This ruling is significant as it introduces the possibility of considering the defence of irresistible impulse even within the limits of the ordinary rules. If the prisoner is proved to have such an impulse he can hardly be said to be able to reason 'with a moderate degree of sense and composure'". However, as with insanity producing legal irresponsibility, it is clear that irresistible impulse can only be a defence to a criminal charge providing it is a feature of a disease of the mind and there is no evidence that a sex chromosome abnormality inevitably produces such a disease. Therefore, a finding of a sex chromosome abnormality *per se* is considered of no significance in relation to a defence of irresistible impulse.

(B) DIMINISHED RESPONSIBILITY

This defence has its roots in Scottish law (*H.M. Advocate v. Dingwall*⁸¹) and was enacted in England in the Homicide Act, 1957. This has been imported into Australia as an amendment to the Queensland Code⁸². The English wording reads:

"... he was suffering from such abnormality of mind (whether arising from a condition of arrested or retarded development of mind or any inherent causes or induced by disease or injury) as substantially impaired his mental responsibility for his acts ..."

The wording in the Queensland amendment is very similar but reads, in part:

78. *Attorney-General for South Australia v. Brown* (1960) 44 C.A.R. 100, 107.

79. J. V. Barry and G. W. Paton, *An Introduction to the Criminal Law in Australia* (Macmillan & Co. Ltd. London, 1948), 30.

80. *R. v. Porter* (1933) 55 C.L.R. 182.

81. (1867) 5 Irv. 466. See Edwards J.L.J. "Diminished Responsibility" in *Essays in Criminal Science* (ed. G.O.W. Mueller, Sweet & Maxwell, London, 1961), 301.

82. Queensland Criminal Code, s.304A.

“. . . as substantially to impair his capacity to understand what he is doing, or his capacity to control his actions, or his capacity to know that he ought not to do the act . . .”⁸³.

It would appear that, as for insanity, sex chromosome abnormality alone does not afford any foundation for such a defence. However, there might well be a defence of diminished responsibility available to a person found to have some abnormality of his sex chromosomes on the basis of mental retardation or psychopathy⁸⁴. It is of interest to note the words of Parker L.C.J. in *R. v. Byrne*⁸⁵ regarding the distinction between the requirements of a defence of insanity and a defence of diminished responsibility. He said⁸⁶:

“‘Abnormality of mind’, which has to be contrasted with the time-honoured expression in the M’Naughten Rules ‘defect of reason’, means a state of mind so different from that of ordinary human beings that the reasonable man would term it abnormal. It appears to us to be wide enough to cover the mind’s activities in all its aspects, not only the perception of physical acts and matters, and the ability to form a rational judgment whether an act is right or wrong, but also the ability to exercise will power to control physical acts in accordance with that rational judgment.”

Thus psychopathy and the personality disorders generally may be seen to be covered by the notion of a defence of diminished responsibility, but only in terms of an abnormality of mind “such as substantially to impair his mental responsibility”⁸⁷. Any sex chromosome abnormality would only be of value in supporting the contention that the accused did suffer from an abnormality of the mind from “arrested or retarded development of the mind or any inherent causes or induced by disease or injury”⁸⁸. The matter has been put in the following manner with regard to the defence of insanity, but the same argument holds for diminished responsibility⁸⁹:

“The important word here is ‘supporting’; but the test for insanity remains a cognitive test and is most certainly not concerned with various aetiological matters. High blood pressure and cerebral arterio-

83. See Gibbs, The Hon. Mr. Justice “Diminished Responsibility” (1963) 1 Med. J. Aust. 877.
84. *R. v. Matheson* (1958) 42 C.A.R. 145; *R. v. Byrne* (1960) 44 C.A.R. 246. Both accused were convicted of murder but the verdict was not upheld on appeal. *R. v. Dowdell*, The Times, January 22nd, 1960 (noted by Edwards, *supra* n.81) concerned an alcoholic psychopath and in *R. v. Spriggs* (1958) 42 C.A.R. 69 the defence was based upon a diagnosis of psychopathy but the jury rejected such a defence. In *R. v. Dunbar* (1957) 41 C.A.R. 182 there was a difference of opinion between the doctors giving evidence as to whether the accused man was a psychopath. In the event the jury rejected the defence of diminished responsibility but the Court of Criminal Appeal substituted a verdict of manslaughter for that of capital murder on a legal technicality.
85. *R. v. Byrne* (1960) 44 C.A.R. 246.
86. *R. v. Byrne* (1960) 44 C.A.R. 246, 252.
87. The meaning to be attributed to the word “substantial” was considered in *R. v. Lloyd* (1966) 50 C.A.R. 61.
88. See English Homicide Act, 1957 s.2(1); and Queensland Criminal Code s.304A.
89. A. A. Bartholomew and G. R. Sutherland “A Defence of Insanity and the Extra Y Chromosome: *R. v. Hannell*” (1969) 2 Aust. N.Z. J. Criminol. 29.

sclerosis may produce a mental state satisfying the requirements of the law on insanity⁹⁰ but an increased blood pressure or arterial disease *per se* is not sufficient. So also is the case with a chromosomal abnormality.”

(C) PROVOCATION

Here again it is considered that a sex chromosome abnormality alone would be of no avail in attempting to set up a defence of provocation. It has been stated⁹¹ that

“it is thought unlikely that, even though it be accepted that the XYY constitution (or any other sex chromosome abnormality) might lead to a low threshold of frustration and aggressive behaviour, such a karyotype would be of avail in terms of a defence of provocation. In *Bedder v. D.P.P.*⁹², affirming the earlier cases of *Mancini v. D.P.P.*⁹³ and *Holmes v. D.P.P.*⁹⁴, Lord Simonds L.C. adopted the headnote in the Law Reports to *Mancini’s* case as a correct statement of the law ‘The test to be applied is that of the effect of the provocation on a reasonable man, so that an unusually excitable or pugnacious person is not entitled to rely on provocation which would not have led an ordinary person to act as he did’ .”

In *R. v. Enright*⁹⁵, a case where the accused, of illegitimate birth, was unduly sensitive to being called a “bastard” and killed a man who “provoked” him by tediously calling him a “bastard”, the court argued that to use the notion of the “ordinary” man involved “disregarding any obsession that the appellant may have had about the use of the word ‘bastard’ and any other mental disorder that he may have had”. Such a point of view squares with *Bedder v. D.P.P.*⁹⁶ and with the cases of *Alexander*⁹⁷ and *Lesbini*⁹⁸ when the mental state in issue was that of mental deficiency. However, the court in *Enright*⁹⁹ then went on to somewhat broaden the notion of the “ordinary” man when they said¹⁰⁰:

“It does not, we think, involve disregarding the appellant’s belief that his mother committed adultery and that he was an illegitimate child, nor, within normal limits, the sensitiveness of such a person on that subject. In that and in all other respects apart from those we have mentioned the ‘ordinary’ man should, we consider, be regarded as standing in his shoes.”

90. *R. v. Kemp* (1956) 40 C.A.R. 121.

91. A. A. Bartholomew, “The Extra Y Chromosome and Criminal Behaviour” (1968) 2 Aust. N.Z. J. Psychiat. 6.

92. *Bedder v. D.P.P.* [1954] 2 All E.R. 801.

93. *Mancini v. D.P.P.* [1942] A.C. 1.

94. *Holmes v. D.P.P.* [1946] A.C. 588.

95. *R. v. Enright* [1961] V.R. 663.

96. *Bedder v. D.P.P.* [1954] 2 All E.R. 801.

97. *Alexander* (1913) 9 C.A.R. 139.

98. *Lesbini* [1914] 3 K.B. 1116.

99. *R. v. Enright* [1961] V.R. 663.

100. *R. v. Enright* [1961] V.R. at 670.

Such words might be construed as suggesting that the court was prepared to recognize, at least to some extent, "a whole range of types of (ordinary) men"¹⁰¹. Brett¹⁰² goes even further in an interesting review of the physiology of reaction to stress and comments that the positive feed-back mechanism and the "all or none" quality of the response make notion of a "cooling off period"¹⁰³ or a graduated response to degrees of stress¹⁰⁴ rather meaningless. He ends his article with a plea for a change, and in particular that appropriate experts might be permitted to give evidence upon "matters of legal or moral obligation, or general human nature, or the manner in which other persons would probably act or be influenced"¹⁰⁵. In the case of those with sex chromosome abnormalities it is not unlikely that differences in their reaction to stress will be found as compared with those with a 46,XY chromosome constitution. But at the present time the notion of the "ordinary" man would seem to persist so that questions relating to chromosome constitutions are of no relevance in relation to a defence of provocation.

(D) SENTENCING AND PAROLING

Fox¹⁰⁶ has very properly inveighed against the "development of an XYY mythology", or, for that matter, the mythology associated with any sex chromosome abnormality. Hall Williams¹⁰⁷ notes that "chromosome evidence" may be relevant after a finding of guilt and he writes under the heading of "mitigation of penalty"

"Here it is conceived that any evidence of this nature could be used to show that the crime may be regarded as no more than an expression of the distorted personality, and a more or less inevitable consequence of it."

Nielsen¹⁰⁸ writes, regarding this matter:

"Another problem of great interest when studying criminality in patients with chromosome abnormalities is the problem of liability for legal punishment of such patients who are *genetically disposed to criminality* (author's italics). Such patients should most probably be given psychiatric treatment and not prison sentence."

Here again, the basic premise is that persons with sex chromosomal abnormalities must of necessity have distorted personalities and that any delinquent or criminal act committed by such a person will equally certainly stem from their biological abnormality. As has already been stated, there is a reasonable amount of evidence available at the present time indicating that there is no one-to-one correlation between sex chromosome abnormality and mental dis-

101. P. Brett, "The Physiology of Provocation" (1970) *Crim L.R.* 634, 637.

102. *Id* at 638.

103. *Duffy* [1949] 1 *All E.R.* 932.

104. *Phillips* [1969] 2 *A.C.* 130.

105. *Phipson on Evidence*, (11th ed., 1970), para. 1296, quoted by Brett *supra* n.101.

106. R. G. Fox, "The XYY Offender: A Modern Myth" (1971) 62 *J. Crim. Law Criminol. & Pol. Sci.* 59.

107. J. E. Hall Williams, (1969).

108. Nielsen J. (1970).

order of significant degree. There are some who view the XYY chromosome constitution with something akin to fear and who would virtually segregate such persons from the moment they are recognized¹⁰⁹ and a similar fate would presumably be visited upon those found with other types of sex chromosome abnormality. Fox has written¹¹⁰

"If the mythology wins out, one can expect that the major role played by the discovery of an XYY constitution in an offender (and other sex chromosome constitutions) will be in relation to his sentencing, institutionalization and, at a later stage, his parole eligibility and discharge. The XYY offender (and those with other chromosome abnormalities) will risk longer sentences of imprisonment, not for purposes of deterrence, vengeance or rehabilitation, but simply out of a desire on the part of the judge to isolate him in order to protect the community from danger. Similarly, the parole board may deny parole to an otherwise eligible prisoner on the ground that he has an XYY constitution (or other sex chromosomal abnormality) which, in their opinion, substantially increases the risk of him recidivating."

Clearly, at this stage, no one is in any position to make any meaningful prediction regarding either personality or future behaviour from the simple statement of a karyotype. Whilst it would appear to be true that a sex chromosome abnormality may increase the likelihood of finding a degree of mental retardation and "psychopathic personality", one cannot go any further and, until we are more aware of the incidence of these karyotypes in the "normal" population, we cannot even indicate the probable size of the correlation between "mental abnormality" and sex chromosome abnormality. It is therefore only right and proper that the finding of an abnormal sex chromosome constitution should not be permitted to play any part in the sentencing and paroling of any individual. It is, for this reason, suggested that physicians, psychiatrists and others charged with giving evidence or writing reports for courts or for parole boards should not comment upon the karyotype of the offender; it is likely in the present climate of our ignorance and our opinions to be rather more of prejudicial than of probative value.

Conclusion

The whole matter may be summarised as follows. Recent research has opened up whole new vistas, and to date it would seem that sex chromosomal abnormalities correlate to same extent with "psychopathic personality" which in turn may "produce" delinquency and criminality. However, before making quite unfounded statements one should heed the comment of Wiener et al.¹¹¹ that

"It is certain that genetic research has done little more than get started and it is also very likely that in the months and years to come further abnormalities will be recognised—abnormalities affecting behaviour and possibly correlating with antisociality, perhaps aggressive and criminal

109. G. H. Valentine and F. Sergovitch, "A New Dilemma" (1967) 2 *Lancet* 151.

110. R. G. Fox, (1971).

111. S. Wiener, G. R. Sutherland and A. A. Bartholomew, (1969).

antisociality . . . One may simply summarise the position by saying that we are far too ignorant at this time to say with meaningful certainty—"This man is 'normal' or even 'responsible'"."

Research must continue to investigate the apparent correlation between sex chromosome abnormality and psychopathy, possibly through cerebral dysfunction, which in turn may lead to difficulty with learning (socializing)¹¹². Such research must be multi-disciplinary involving the cytogeneticist, the biochemist, the neuro-physiologist, the psychologist, psychiatrist and sociologist. It is also apparent that the ramifications of the possible correlations with sex chromosome abnormality require that the law takes an active interest in the results of such research; not a simple passive interest but an active concern that there should be real communication between the law and the scientists and that in much criminological research there is true co-operation.

112. See nn.10, 56 and 57.