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IS THERE EVIDENCE OF A PHYSICAL BASIS FOR CRIMINAL BEHAVIOR?¹

William B. Tucker²

In the field of the social sciences there has been approximately as much investigation into the cause of crime as there has been, in the biological sciences, research into the etiology of cancer. In the one case crime may be broadly regarded as a malignant growth in a social body—anti-social behavior. In the other, cancer is a malignant growth in an organic body—anti-organic behavior. In the search for the causes of either, in order to facilitate control, prevention and eradication, both environmental and hereditary factors have been exhaustively studied. The parallel of course is far from perfect. No clear-cut answer to the question of etiology in either case can be given at the present time. Lacking such a complete answer, known facts must be examined, to understand either condition, and to guide us in our understanding of either problem.

As the physician will not have marked success in the control of cancer without greater understanding of its causes, so there seems to be general agreement among sociologists and criminologists that there can be no appreciably effective control of crime without greater knowledge of its etiology. The research of the past twenty years, in

the United States and abroad, has been concerned with efforts along many lines to ascertain more clearly the causes of crime and the delineation of the criminal. European investigations have more generally been concerned with physical, biological and psychiatric factors; American research, for reasons that do not need to be elaborated here, has dealt primarily with the psychological and sociological parts of the picture. Each group has contributed facts to the mounting body of knowledge of the etiology of crime. Sutherland³ groups the various theories of crime as follows: (a) biological, (b) personality, (c) primary social groups, (d) broader social processes. From the many theories expounded and the facts presented it has been inevitable that confusion should still exist, for, as Draper⁴ has pointed out, "The causes of crime in general are extremely complex and multiple. No single cause has been scientifically determined as the responsible agent for criminality."

Perhaps because the biological factors in the etiology of crime have received comparatively little attention in this country, the recent contribution of Hooton⁵, on the role of the physical make-up in etiology of crime, has re-

¹ Revised version of address before the Chicago Academy of Criminology, November 10, 1939.

² Frank Billings Medical Clinic, University of Chicago.

³ Sutherland, E. H.: *Principles of Criminology*, Philadelphia and New York, J. B. Lippincott Co., 1939, p. 55.

⁴ Draper, Paul A.: *Mental Abnormality in Relation to Crime*, *Amer. Jour. of Med. Jurisprudence*, 2: 161 (March-April), 1939.

⁵ Hooton, Earnest Albert: *The American Criminal: An Anthropological Study*, Cambridge (Mass.), Harvard University Press, 1939.

ceived extraordinary attention and criticism. Hooton's thesis, briefly stated, is that there is a physical basis for criminal behavior, whatever other factors play a role. He carefully delineated the scope of his investigation of 14,477 criminals, county jail inhabitants, and delinquents (as compared with 3,203 non-criminal controls) when he said in his summary volume of Lowell Institute Lectures⁶:

It is no part of this research to examine the extent to which the criminal's behavior is determined by his mental deficiency or sufficiency, or by the state of his mental health. Nor is it incumbent upon us to ascertain to what precise degree the career of the delinquent is an effect of his social environment. Our task is to study the physical characteristics of criminals for the purpose of discovering whether or not these are related to antisocial conduct.

Aside from whatever criticisms that may be made of Hooton's methodology and of his interpretation of his results, there should be no criticism of this approach. Man, criminal or non-criminal, is an organic being, born with a more or less immutable organic structure, functioning within the limits of his genetic structure under the influence of his environment. As Hooton intimates, others have chosen to explain crime in terms of intelligence, mental deficiency, psychiatric states, and many psycho-social conditions. Hooton chooses to test the validity of the thesis that the physical structure of the individual is likewise a contributory factor.

Hooton is well aware of the fact that he is walking on ground unpopular among students of crime. He says in this connection⁷:

Distrust of anatomical guides through the maze of human conduct has resulted in a flat denial of the relationship of the body to the mind and to behavior, loudly voiced by bigoted social scientists and feebly echoed by timorous students of human biology.

A finger here is put on a vital spot in our body of scientific knowledge, both sociological and biological: is there *any* relationship between morphology and function? Hooton's work can be understood only in the light of the understanding of this larger problem.

As we have pointed out⁸, a vast amount of work has been done in investigating the relations between man's constitution and his behavior. The idea is ancient. Aristotle hypothecated a relationship between form and behavior. Celsus, 2000 years ago, claimed a relationship between constitution and function. Polemonis in the third century A.D., Adamantius a century later, Avicenna in the eleventh century, and Giambattista della Porta in the sixteenth century, claimed that similar correlations exist. Walkington in 1663 correlated constitution with psychiatric disturbances; John Hunter, recognizing the complex nature of constitution, studied its relationship in disease in fairly scientific fashion in the eight-

⁶ Hooton, Earnest Albert: *Crime and the Man*, Cambridge (Mass.), Harvard University Press, 1939, p. 5.

⁷ Hooton, E. A.: *Crime and the Man*, *op. cit.*, p. 3.

⁸ Tucker, W. B., and Lessa, W. A.: *Man: A Constitutional Investigation*, *Quart. Rev. Biol.* 15 no. 3 (Sept.) and no. 4 (Dec.), 1940.

eenth century; and many others wrote of such relationships.

It was therefore perhaps natural that this tendency, to note a relationship between form and function, should have been carried too far. Gall and Spurzheim,⁹ at the end of the eighteenth and in the early part of the nineteenth centuries published their work on phrenology, which has since been so discredited that constitutional studies have not yet recovered from the disrepute reflected from the over-enthusiasm of the phrenologists. Yet there are in Spurzheim's work observations which are in accordance with present-day scientific knowledge.

It was in this setting, about forty years after Gall and Spurzheim, that Césaire Lombroso published his famous book, "L'Uomo Delinquente"¹⁰. Its contents, as well as the dicta later propounded by Lombroso and his followers, Garofalo, Ferri, and others, are too well known among criminologists to need restating. As Ross¹¹ has pointed out, Lombroso "had poor and scanty data and preceded the development of modern statistics." Hooton¹² says of Lombroso's work:

No impartial and accurate investigator has taken the trouble to go into the question with sufficient thoroughness either to refute or to confirm Lombroso's claims. A completely new survey of all documented crania, carefully distinguished as to race and nationality and compared with adequate samples of the

crania of civilians of the same ethnic and racial origin, will provide the only solution of the problem.

Not agreeing with Lombroso's untenable conclusions as to atavistic and degenerative traits, Hooton does caution against drawing the conclusion that *all* of Lombroso's results are erroneous.

The tide had turned. The philosophical observations of early writers, the inadequate data of the earliest scientists, the overdrawn conclusions of the phrenologists, the fairly obvious loop holes in many of Lombroso's arguments, led to a mounting distrust of the constitutional approach, in the light of the newer science. Dr. Charles Goring set out avowedly to disprove Lombroso's thesis, and his book, "The English Convict"¹³, published in 1913, is widely accepted as having accomplished this purpose. But Goring, too, had inadequate control data, in addition to a strong and open antagonism to the Lombrosian doctrine, and his conclusions must likewise be accepted with reserve. In spite of Goring's bias, his inadequate controls, and his questionable statistical manipulations, it is important to note that he says "there is no such thing as an anthropological criminal type", *but* ¹⁴

despite this negation and upon the evidence of our statistics, it appears to be an equally indisputable fact that there is a physical, mental, and moral type of person who tends to be convicted of crime . . .

⁹ Spurzheim, J. G.: Phrenology in Connexion with the Study of Physiognomy, Boston, Marsh, Capen & Lyon, 1833; and Gall, F. I., and Spurzheim, J. G.: Recherches sur le Système nerveux, Paris, 1809.

¹⁰ Lombroso, Césaire: L'Uomo Delinquente, ed. 4, Torina, Flli. Bocca, 1889, and Crime, Its Causes and Remedies, by Horton, Boston, 1911.

¹¹ Ross, Frank A.: Review of "The American Criminal," Amer. Jour. Sociol. 45: 477-480, 1939.

¹² Hooton, E. A.: Crime and the Man, *op. cit.*, p. 14.

¹³ Goring, Charles: The English Convict, London, H. M. Stationery Office, 1913; abridged edition, 1919.

¹⁴ Goring, *op. cit.*, p. 269, *abr. ed.*

There would be little excuse for surveying these points in this fashion were it not for parallels occurring in other branches of science. The constitutional problem is not one which applies only to crime, but also to physiology, disease, and psychological behavior. The challenge of the problem appealed to workers in many fields. Beginnings of anthropometry appeared with Elsholzius in 1654 and Quetelet in 1871. Soon statistical procedures were to be elaborated to serve as precise instruments for the evaluation of scientific data.

The Nineteenth Century was a period of emerging science, amid vast confusion. The researches of Robert Koch, Louis Pasteur, and many others in the biological field, served to emphasize the environmental factors in human medical behavior. Advances in psychological and sociological research methodology tended to heighten this effect with regard to other forms of human behavior. In the field of medicine, for example, the main emphasis in research came to be on the role of environmental factors, with respect to infectious and other diseases.

Only in isolated areas did the constitutionalists survive the period of environmental enthusiasm. The Italian school, of di Giovanni, Pende, Viola, Naccarati; the German school, of Martius, Tandler, Bauer, Beneke; the French group, of de Troisième, Rostan, Sigaud, MacAuliffe, and Thoëris;—these, and others, did for medicine and biology what a few had begun in other

fields, as for example criminology: they studied man's physical structure as it reacted to his environment, instead of emphasizing only the latter. Thus there came into being the morphological school and the morphological method, of which Hooton may be considered the legitimate descendent.

Recently in this country more attention has been given to environment influencing physical structure, especially during growth and maturation. Child development centers in Boston, Washington, Cleveland, Iowa City, Antioch, Minneapolis, Denver, and Berkeley, to mention only a few of the better known laboratories, have added to our knowledge of the relative role of heredity and environment. The nutrition-illness studies of Bakwin and Bakwin, the generational studies of Boas, and the depression studies of Palmer¹⁵ "as proof that the food environment, the socio-economic milieu, the socio-cultural background all register themselves physiologically in skeleton, muscle, and tissues" illustrate the complexity and difficulty of the problem of accurately evaluating environmental and hereditary forces. But McCloy and associates¹⁶ at Iowa City found little effect of the environment in the development of the hereditarily determined physical status, allowing for measurable fluctuations of nutrition and muscular development.

The problem of studying the relation of morphology to function has been complicated unnecessarily by anatom-

¹⁵ Krogman, W. M.: *Trend in the Study of Physical Growth in Children*, *Child Development*, 11: 279-284, December, 1940.

¹⁶ McCloy, C. H.: *Appraising Physical Status*

and the Selection of Measurements, vol. 12, no. 2, 1936; and *Appraising Physical Status: Methods and Norms*, vol. 15, no. 2, 1938, Univ. of Iowa Studies, Studies in Child Welfare.

ists, physical anthropologists, and other morphologists. Seeking accuracy, they have neglected the measurement of large parts of the human organism. Fortunately in recent years, in physical anthropology especially, there has been an awakened interest in a broader viewpoint: indices are no longer being studied *per se* but as part of an integrated morphological picture; and relationships with basic physiological patterns are being investigated. It is to this group that Hooton belongs.

Any adequate study of morphology-behavior relationships must rest on a sound system of morphological classification. Many classifications have been elaborated, most of them strikingly similar in pattern.¹⁷ One of the most recent and promising of these is that of Sheldon,¹⁸ who is able to recognize and measure in every individual the simultaneous existence, *to some degree*, of three components, (1) a soft, round, fat-bearing component, called *endomorph*; (2) a rugged, firm component composed chiefly of musculo-skeletal elements, called *mesomorphy*; and (3) a component tending toward the relative absence of the other two, toward fragility, leanness of structure, called

ectomorphy. He thus avoids the "type" error common to many of the earlier morphologists.

Based on such increasingly accurate systems of morphological appraisal, and employing the careful techniques of the anthropometrist and the statistician, in recent years workers in many fields have found definite correlations between variations in physique and in behavior.

Petersen,¹⁹ Gildea, Kahn and Man,²⁰ and Bauer,²¹ to name but a few, found evidence of correlations between morphological and physiological variables. Lucas and Pryor²² established differential standards for basal metabolic rates, depending on variations in body build. As has been summarized elsewhere,²³ biologists have demonstrated a relationship between body build and such diseases as rheumatism, tuberculosis, peptic ulcer, migraine, heart disease, and gall-bladder disease, to give but a partial list. Even in the field of psychology a number of satisfactory reports have indicated that psycho-social behavior depends in part at least on morphological variations in structure. Especially important in this connection is the work of Naccarati,²⁴ Heidbreder,²⁵ Sheldon,²⁶

¹⁷ Tucker, W. B., and Lessa, W. A.: *op. cit.*

¹⁸ Sheldon, W. H., with the collaboration of W. B. Tucker and S. S. Stevens: *The Varieties of Human Physique*, New York, Harpers, 1940.

¹⁹ Petersen, W. F.: *Constitution and Disease*, *Physiol. Rev.* 12: 283-308, 1932.

²⁰ Gildea, E. F., Kahn, E., and Man, E. B.: *The Relationship Between Body Build and Serum Lipoids and a Discussion of These Qualities as Pkynophilic and Leptophilic Factors in the Structure of the Personality*, *Amer. Jour. Psychiat.* 92: 1247-1260, 1936.

²¹ Bauer, J.: *Innere Sekretion: Ihre Physiologie, Pathologie, und Klinik*, Berlin, Julius Springer, 1927.

²² Lucas, W. P., and Pryor, H. B.: *The Body Build Factor in the Basal Metabolism of Children*, *Am. J. Dis. Child.* 46: 941-948 (Nov.), 1933, pt. 1.

²³ Tucker, W. B., and Lessa, W. A., *op. cit.*

²⁴ Naccarati, Sante: *The Morphologic Aspect of Intelligence*, *Arch. Psychol.* no. 45 (Aug.), 1921.

²⁵ Heidbreder, E.: *Intelligence and the Height-Weight Ratio*, *J. Appl. Psychol.* 10: 52-62 (March), 1926.

²⁶ Sheldon, W. H.: *Social Traits and Morphological Types*, *Personnel Jour.* 6: 47-53, 1927; and *Morphological Types and Mental Ability*, *J. Person. Res.* 5: 447-451, 1927.

Paterson,²⁷ Kretschmer,²⁸ Wertheimer and Hesketh,²⁹ Cabot,³⁰ and Connolly.³¹ And Petersen and Reese³² have recently stated that psychological and psychopathic moods vary with shifts in blood chemistry, the pyknic individual experiencing more of a change of mood with a shift toward alkalinity of the blood, the leptosome with a shift toward greater acidity.

Such, then, very briefly, is the evidence of a physical basis for physiological behavior, medical behavior, and psychological behavior. The earlier evidence of a physical basis for criminal behavior has been mentioned. After Lombroso and Goring, along with these investigators in other fields, Hooton believes there is a physical basis for criminal behavior. But he carefully states that there is *not* a criminal type:³³

No one . . . would conceive it possible to utilize for purposes of practical criminal diagnosis any rigid multiple combination of morphological features supposed to constitute a criminal type . . . All that can be expected of the . . . typing of criminals is that excesses of this kind or that kind of offense may be demonstrated for the several sub-groups.

On the basis of his studies, Hooton believes that the criminal is differentiated morphologically from the non-criminal, but not in an easily recognizable fashion. More important, perhaps,

he finds clearly distinguishable differences between his various offense groups. He finds, for example, that tall thin men tend to murder and rob; tall heavy men tend to kill, to forge, to defraud; small thin men tend to steal and to burglarize; short heavy men show a tendency toward assault, rape, and sex crimes; and mediocre men tend to break the law without obvious discrimination or preference. Note well the word "tend." Here is no valid diagnostic criterion, used by itself, for an individual case. Much as a physician employs many factors such as age, occupation, disease record, body build, etc., as aids in diagnosis, Hooton suggests that a physical evaluation may *aid* in the study of the criminal and the causes of crime.

These comparatively sound conclusions of Hooton's are to be sharply differentiated from much of the rest of his work. Throughout much of it recur references to "biological inferiority," which relatively unsubstantiated conclusions serve Hooton as the basis for his eugenical program. These two parts of his work are irretrievably intermingled. This has resulted in criticisms directed primarily toward the latter aspect of his work being carried over to all of it, probably without justice. Further, in evaluating Hooton's

²⁷ Paterson, D. G.: *Physique and Intellect*. Century Psychology Series. New York, The Century Co., 1930.

²⁸ Kretschmer, Ernst: *Physique and Character*, London, Kegan Paul, Trench, Trubner & Co., 1925 and 1936.

²⁹ Wertheimer, F. I., and Hesketh, F. E.: *The Significance of the Constitution in Mental Disease*, Medicine Monographs, vol. 10, Baltimore, Williams and Wilkins Co., 1926.

³⁰ Cabot, P. S. de Q.: *The Relationships Between Characteristics of Personality and Phy-*

sique in Adolescents, Genetic Psychology Monographs, vol. 20, no. 1 (Feb.), 1938.

³¹ Connolly, C. J.: *Physique in Relation to Psychosis*, Stud. in Psychol. and Psychiat., Washington, Catholic Univ. of America Press, Monograph serial no. 5, vol. 4, 1939.

³² Petersen, W. F., and Reese, H. H.: *Psychotic and Somatic Interrelations*, J.A.M.A., 115: 1587-1590 (Nov. 9), 1940.

³³ Hooton, E. A.: *Crime and the Man*, *op. cit.*, p. 104.

work, it must be remembered that he was a Classical scholar before undertaking his serious scientific studies.

The most serious objections to Hooton's conclusions have been concerned with his position with regard to the suspected "biological inferiority" of the criminals studied. Reuter³⁴ states that Hooton's "general theoretical position is an extreme biological determinism," and states further that Hooton "is not clear, or at least not articulate, as to whether he considers race to be a biological reality or a statistical construct." Reuter "likes Mr. Hooton's book" but "considers it the funniest academic performance that has appeared since the invention of movable type." Unfortunately Reuter's justifiable criticisms of Hooton's book are weakened by an apparent failure to understand the larger implications of the work.

Merton and Ashley-Montagu³⁵ have focussed their criticism largely on Hooton's same position with regard to biological inferiority. They point out that "two distinct interpretative tendencies run through the work: one, a cautious and admirably restrained effort to assay the significance of biological factors in the determination of the incidence of criminal behavior; the other, a pugnacious and flamboyant insistence on the biological determination of crime." Tilting at the latter half of Hooton's unbalanced armor, Merton and Ashley-Montagu do not find a clear definition of "organic inferiority," then consider possible meanings of the term,

and proceed to demolish them with fact and logic. One may suspect that they have fallen into the same trap in which they have placed Hooton. But on the basis of their analysis of this portion of Hooton's work, and it is the most careful if not the most studied that has yet appeared in print, it is not possible at the present time to accept Hooton's position³⁶ that "criminals as a group represent an aggregate of sociologically inferior and biologically inferior individuals." Sociologically inferior they may be, partly by definition, but the case for biological inferiority must be considered as not proved. Hooton may ultimately prove to be right. He may be far ahead of his time, but modern conceptions of "organic inferiority" and "biological inferiority" do not permit acceptance of his statements of axiom in this connection as fact.

Less serious than these objections are others made by all critics of Hooton's reports on his criminological studies. As Ross³⁷ states,

Hooton appears to have the mistaken idea that all data gathered in any fashion in jails, penitentiaries, etc., are "sample" data in the sense that they represent the universe of the criminal. He makes brave and convincing defense of his materials and acknowledges certain flaws, even going so far as to correct some deficiencies. But in the light of present-day knowledge of sampling methods his data appear to be open at points to specific challenge.

The objections raised may be summarized: (1) Hooton did not take non-physical factors into account suffi-

³⁴ Reuter, E. B.: Review of "Crime and the Man," *Amer. Jour. Sociol.* 45: 123-126, 1939.

³⁵ Merton, R. K., and Ashley-Montagu, M. F.: *Crime and the Anthropologist*, *American An-*

thropologist, n.s. vol. 42, 384-408, 1940.

³⁶ Hooton, E. A.: *The American Criminal*, *op. cit.*, p. 300.

³⁷ Ross, F. A., *op. cit.*

ently; (2) his assumption that incarcerated criminals are representative of all criminals is untenable; (3) his controls were inadequate; and (4) some of his statistics are open to challenge.

Concerning the first of these objections, it has already been pointed out that Hooton deliberately chose not to study the non-physical basis of crime, leaving that aspect to the sociologists and criminologists. Concerning the second, there is some evidence³⁸ that prison samples are not characteristic of all criminals, but this is a practical problem hard to overcome when one wishes to study a group of criminals, and, lacking the perfect group to be studied, it may not be unwarranted to accept tentatively the representativeness of the prison group. The fourth objection is the weakest, for careful study fails to reveal serious misuse of statistical techniques, though one may sometimes question the interpretations.

In considering the third major objection to the validity of Hooton's findings, the inadequacy of his controls, probably too much attention has been paid to the 146 Nashville firemen, and not enough to the fact that a total of 3,203 non-criminals were employed in the analysis. "In Massachusetts and in Colorado criminal insane were matched with a series of civil insane, and a similar procedure was followed in the case of criminal insane Negroes in North Carolina."³⁹ Certainly the controls are far from perfect, as Hooton readily admits. Hooton claims to have made due stat-

istical allowance for the inadequacies. Pending the completion of publication of his material and a careful analysis of all the data, it does not seem warranted on the basis of this fault to throw out entirely such conclusions as "eight of ten offense groups of criminals are anthropometrically distinct each from the total series," or "eight of eleven occupational groups give clear indication of being anthropometrically distinct from the total series of which they form a part."⁴⁰ Making due allowances, therefore, for such relatively minor faults in Hooton's argument, it still may be conservatively stated that physical (anthropometric) differences have been demonstrated, between criminals and non-criminals, but especially among offense groups.

If this position is tenable—and it seems to be, on the evidence now available—there should be no cause for concern, but rather cause for quickened interest, to follow down a lead offering greater or less promise of solving the complex cause of crime. If, as Hooton finds, criminals are distinguished by low and sloping foreheads, small brain cases, small heads, straight hair, narrow jaws, long necks, and so on, it follows that further research is needed to fit these disjointed observations into a pattern. It must also be realized that Hooton does not stand alone, in finding significant physical differences among criminals. Langfeldt,⁴¹ studying thieves, burglars and other criminals comprehensively, from morphological

³⁸ Sutherland, E. H., *op. cit.*, pp. 29, 37, 45.

³⁹ Hooton, E. A.: *Crime and the Man*, *op. cit.*, p. 21.

⁴⁰ Hooton, E. A.: *Crime and the Man*, *op. cit.*, pp. 70, 80.

⁴¹ Langfeldt, Gabriel: *Der Dieb und der Einbrecher*, Oslo, 1936, pp. 62-64.

and psychological, but chiefly sociological standpoints, finds leptosomes and schizothymes to be the commonest of the physical and psychological types among criminals, and quotes other investigators to the same effect. Berry and Büchner⁴² found a correlation between the size of the head and intelligence, and found criminals to have lower brain capacity than other groups. Gray,⁴³ in a careful anthropometric study of Illinois convicts, found a great many of his measurements affected by the age of the individual, again demonstrating the difficulty of the problem. De Pina⁴⁴ finds the nasal index useful in distinguishing between normal and delinquent individuals, but he also⁴⁵ advocates use of a more comprehensive "morphological method" instead of relying on such indices as the cephalic index or nasal index alone. In this contention Frassetto⁴⁶ likewise concurs.

These and other studies indicate that there is almost certainly a relationship between certain morphological variations and certain criminal proclivities, whatever other factors play a role. But the thin trail of relationship is far from being adequately mapped. Interesting leads in other fields have been dis-

covered, and in time may give us a more complete picture of the problem.

Tulchin,⁴⁷ for example, has made a careful study of the relation of intelligence, to crime, taking into account such variables as age, sex, offense, race, nationality, etc. He does not find that criminals as a group differ in intelligence from civil controls, but has demonstrated a definite relationship between certain types of crime and the intelligence of the offender. More significantly, it has been shown that mental abnormality is important in the etiology of crime. Draper⁴⁸ states that "mental abnormality is responsible for about one-fourth to one-third of criminality"; and that

The mentally ill criminals come from the 2 per cent of the general population who show mental abnormalities. Therefore, many more criminals are drawn from the class who are mentally abnormal in proportion to their percentage of the general population than from the rest.

This finding is the more important, in understanding the causes of crime, in the light of the findings of many workers,⁴⁹ that there is a definite relationship between physique and mental abnormality.

It is true that eminent investigators have published negative results. Hrd-

⁴² Berry, Richard J. A., and Büchner, L. W. G.: The Correlation of Size of Head and Intelligence as Estimated from the Cubic Capacity of Brain of 355 Melbourne Criminals, *Proc. Roy. Soc. Victoria*, n.s. vol. 25, 229-253, 1913.

⁴³ Gray, H.: Body-Build in Illinois Convicts with Special Reference to Age, *Jour. Crim. Law and Criminology*, 25: 554-575 (Nov.-Dec.), 1934.

⁴⁴ de Pina, Luís: Índice Nasal em Delinquentes Portugueses, *Arquivo da Repartição de Antropologia Criminal, Psicologia Experimental e Identificação Civil do Pôrto*, fasc. 3, 265-268 (Dec.), 1931.

⁴⁵ de Pina, Luís: Delinquência, alienação mental e morfologia craniana, *Arquivo da Repartição de Antropologia Criminal, Psicologia Experimental e Identificação Civil do Pôrto*, fasc. 3, 231-238 (Dec.), 1931.

⁴⁶ Frassetto, Fabio: Les formes normales du crâne humain. Leur genèse et leur classification. *Bull. de la Soc. d'Étude des Formes Humaines*, nos. 3-4, Paris, 1929.

⁴⁷ Tulchin, Simon H.: *Intelligence and Crime*, Chicago, Univ. of Chicago Press, 1939.

⁴⁸ Draper, P. A., *op. cit.*

⁴⁹ See references 28, 29, 30.

licka⁵⁰ in 1897-1899 measured 1000 inmates of the New York Juvenile Asylum, found 77 of these "criminal or vicious," and stated that the transgressors could not be physically separated from the rest of the children in the institution, and "in all probability" also from children of similar social classes outside. Hrdlicka does admit⁵¹

. . . that there are recognizable anthropometric differences between the averages of the main criminal groups—the brutal killers, the highway robbers will in the average differ from thieves or forgers, etc. But such differences are neither sufficiently characteristic nor universal. From the scientific point of view, it must be acknowledged that there is not a single physical sign, nor a collection of such signs, which would permit the diagnosis of anyone as a prospective criminal before he had committed a crime.

With this position Hooton probably would be in general agreement. But unwarranted would seem to be such a further statement of Hrdlicka's:⁵²

Crime is not physical; it is mental. It is not due to disorders or abnormalities of the body, but partly to acquired anti-social habits, partly to brain, nervous system, and the internal glandular disorders. The criminal "facies," of whatever sort, is not inborn, but acquired through the criminality and the reactions of the criminal with other people.

Apart from the inferred inconsistency that there is no relation between the physical make-up and the brain, the nervous system, and the endocrine glands, the chief criticism to be made of such a statement is that Hrdlicka denies *in toto* the role of the physical

in crime. The truth is probably somewhere close to both Hooton's and Hrdlicka's positions; for Hooton does not claim more than that the physical make-up is *one* factor in the etiology of crime, and further research may show its role to be a minor one compared with other complex factors now largely studied by criminologists.

Criminological research today can be understood only in the perspective of knowledge of man as an organic whole, certainly not forgetting his physical make-up. Sands⁵³ states that

Today the human being is regarded as a total personality, as a behavior organism in which every part of his constitution participates in his reaction to situations. All observers now realize the importance of regarding the human being as a whole.

Cantor,⁵⁴ in an exhaustive survey of recent tendencies in criminological research, makes some highly pertinent interpretations:

. . . the student acquainted with the crimino-biological literature . . . cannot . . . get rid of the impression that the crimino-biological movement is tremendously important. Currently in this country we have overemphasized . . . the importance of environmental influences. Hundreds of environmental studies in crime causation have been carried on in this country. We are still far from understanding the causes of crime. It may well be that apart from faulty methodology and inadequate techniques, the barrenness of results is due to our over emphasis upon the sociological or environmental approach.

He points out, as the result of careful studies of criminal tendencies in mon-

⁵⁰ Hrdlicka, Ales: *Anthropological Investigations of One Thousand White and Colored Children of Both Sexes*, New York and Albany, 1899.

⁵¹ Hrdlicka, Ales: *The Criminal*, *Jour. of Criminal Psychopathology*, vol. 1, 87-90 (Oct.), 1939.

⁵² Hrdlicka, Ales: *The Criminal*, *op. cit.*, p. 90.

⁵³ Sands, Irving J.: Discussion of paper by Petersen and Reese, 32.

⁵⁴ Cantor, Nathaniel: *Recent Tendencies in Criminological Research in Germany*, *Jour. Crim. Law and Criminology*, 27: 782-793, 1937.

ozygotic and dizygotic twins, that "it is highly improbable that the social environment alone" accounts for crime, and reasons that

Because behavior is manifested only in a cultural setting ("social environment") is no reason to deny the role of the organic structure.

Cantor thus joins researchers in all fields of behavior in maintaining that research into causes of behavior, criminal or otherwise, must take into account *both* physical and environmental factors. Surveying criminological research he finds that there already is agreement among many students of criminology on a number of common points:

1. They all agree upon the desirability of understanding the criminal personality as a whole.

2. This can be attained only by viewing his behavior as a *configuration* of the interplay between objective environment factors and the subjective, constitutional, biological, inherited tendencies.

3. Hence, the methods of any science which may aid in this investigation are legitimate, whether they are those of biology, anthropometry, psychology, psychiatry or sociology.

4. No sharp distinction between the methodology of the natural and the social sciences can be drawn.

5. The majority of workers are more or less agreed upon the meagerness of results to date, upon the caution with which conclusions must be drawn, and, what is most important, upon the fact that out of their joint efforts the classification of crimino-biological types will eventually emerge.

Little can be added to this. A dispassionate appraisal of the evidence available indicates that there is at least some physical basis for criminal behavior, however small it may be. Research in criminology, as in biology, medicine, and even psychology and sociology must be guided by the knowledge that man is first an hereditary organic whole and secondarily influenced by his environment. The age-old "heredity vs. environment" argument is no longer entirely valid, for the *versus* gives way, in compromise, to the probability that both factors are potent. The assessment of the relative importance of either in criminology must wait further joint bio-sociological research.