Introduction

The criminological sciences still represent a vast research field, particularly with regard to the neuropsychiatric aspects of the individual linked to crime. They are also developing research into the genetic constitution, and in the future, we expect news more and more interesting. In this paper, we wanted to review a historical period, the 1800s, in which there was an intense research about the neurophysiological aspects of brain functions. Eminent neuroscientists assessed, empirically and experimentally, higher brain functions such as language, behavior, memory, emotions. In short, human neurophysiology, in 1800, lived an era of great scientific fervor, and in that time, another school of thought, the morphoanthropological one, was facing thanks to the Italian physician Cesare Lombroso, who correlated the tendency to crime to morphology of the criminal, especially to specific physical features. We rode in this paper the stages of that historical period, highlighting the importance of neurophysiology to understand the criminal acts and reviewed critically the Lombrosian theories focused on morphoanthropology.

Discussion

Down and Dirty (Brutti, sporchi e cattivi) was a movie of 1976, directed by an Italian great movie director as Ettore Scola (1931–2016), who expressed, in marvelous way, various grotesque aspects of a small community, made of petty thieves talented for theft, robberies, swindles, distorted sex acts, in the context of promiscuity squalid shantytown. They had in common some somatic traits, such as ugliness and filthiness. Therefore, trend to crime in these subjects was related to morphological and environmental aspects, however, the whole in an ironic sense, since it was a movie. Effectively, common sense wants that the criminal man has broadly these stigmata that are the exterior, the morphology, the face, dress in rags, look bad. This concept of criminal man, based on his
morphological aspects, was pointed out by the Italian criminologist Cesare Lombroso (1835–1909), who theorized that crime was related to physiognomic human traits, sign of atavism, identifying the born to crime. 1 The criminal is an atavistic individual that mimics the ferocious primitive instincts of mankind and animals on their person2 was his memorable phrase. Lombroso's theories were based precisely to distinguish criminals from their physical aspect, especially the face. Practically, the criminal would be a human regression in primitive subhuman, like apes and primates, and so, into a wild man, incompatible with the rules of a modern society and unavoidably brought to crime. So the born to crime in Lombroso was described by abnormal anatomical findings as skull deformities, facial asymmetries, large size ears, prognathism, abnormal teeth, wrinkled skin, long limbs, but also extra-anatomical features, total absence of moral sense, narcissism, cruelty, vindictiveness, excessive impulsiveness. Criminal men were also subjects affected by psychopathological disorders and even epileptics were included in this list of criminals, responsible of atrocious crimes and other violent social acts. The first epileptic subject studied was a nobleman, whose «sadistic quirks» were considered by Lombroso as equivalent to access epileptic; the second man was the Calabrian soldier Salvatore Misdean, who killed some fellow soldiers and upon awakening, after the criminal fact, showed neither complete unconsciousness (as people with epilepsy), nor any remorse (acting as the born to crime). The discussion about the influence of epileptic factor on delinquent gesture must since the previous decade in these two cases, when scientific analysis more properly the epileptic phenomenon had led to breakthroughs such as disturbing discoveries, both because of the vastness of the medical and pathological horizon, both because of the questionable methods of experimentation. Epilepsy appeared as the explanation of growth arrest in criminals and of remorse, moral insanity in its episodes. Then, in criminal woman, prostitution arrest in criminals and of romping moral insanity experimentation. Epilepsy appeared as the explanation of because of the vastness of the medical and pathological led to breakthroughs such as disturbing discoveries, both...
that bilateral lesions of temporal lobe, involving amygdala and hippocampus, in Rhesus monkey caused a series of symptoms as hyperphagia, hypersexuality, hyperorality and absence of fear. There is still the case of Phineas Gage (1823–1860), an American railway construction worker, who suffered by an incident, in which an iron bar passed through his head, provoking a damage in frontal lobe cortex. He survived but reported dramatic changes of personality, social behavior and mood disorders as hyperanxiety or aggressiveness. Today special attention is given to crime genetics: constantly advancing studies open up new and interesting perspectives about the possible influence of genotype on the genesis of criminal behavior. It was considered the term "criminal gene" which correlates the violent and antisocial behavior at low activity allele of MAO-A gene (Monoaminoxidase gene A). The genetic cause of crime was already alleged in the years 60–70s, when it was postulated that men who carried an extra Y chromosome, the so-called XYY syndrome, were thought to be at increased risk of violence, a subsequentely disproven contention. In 1993, Brunner described the case of a Dutch kindred, in which several males exhibited borderline mental retardation and abnormal behavior, including disturbed regulation of impulsive aggression. They were found to have a complete absence of activity of the enzyme monoamine oxidase A (MAO-A), which metabolizes several key monoamine neurotransmitters. Genetic analysis revealed that the affected men carried a mutation on their X chromosome in the gene that codes for MAO-A, that rendered the enzyme inactive. The authors suggested that genetic defects in neurotransmitter metabolism may affect aggressive behavior. Exploring the interactions of the participants’ genetic endowments with their environmental circumstances, the researchers looked at the impact of maltreatment between the ages of three and 11 on later antisocial propensities of participants with either high or low MAO-A activity. They found that manifestations of antisocial behavior were significantly increased in the group that had both low MAO-A activity and a history of severe maltreatment. In contrast, for participants with high levels of MAO-A, even in the presence of maltreatment, the increase in antisocial activity was much less significant. The overall impact of this gene-environment interaction was evidenced by the fact that the 12 percent of the study group that had both low MAO-A and maltreatment, valued about 44 percent of the convictions for violent crime. Eighty-five percent of the males, with both risk factors, developed some form of antisocial behavior. Other studies proposed that hormon al activity (high testosterone levels) may be responsible for both low MAO-A activity and violence. Another study later showed that functional connectivity between the ventro-medial prefrontal cortex (vmPFC) and the amygdala, belonging to the limbic lobe, was increased only in males with the low MAO-A prefrontal gene. In addition, that study found that when performing an emotional face matching task, low MAO-A activity males showed increased activation of the amygdala and decreased activation of the vmPFC, compared to control subjects. Also a link between the crime and the dopaminergic and serotonergic system was found, as evidenced by studies on alcohol intoxication, related to lower thresholds of aggressive behaviors. In this association study of two independent samples, a number of candidate gene variants (5HT2A T102C, 5-HTTLPR, DRD Ins-141Del, DAT1 VNTR) were related to violent criminal behavior and alcohol-related aggressive traits. Finally, the influence of the environment on crime: poverty, malnutrition, alcoholism, drug abuse, family and social degraded context, but also, though less frequent, social and family conditions wealthy, extremist political beliefs, mistreatment, torture, especially in the child and adolescent ages, are all factors, along with many others, which can contribute, together with the individual genotype, to generate violence and criminal behavior. This historical review offers some reflections: during 1800s, neurophysiological knowledge was at the heights and the second half of the century demonstrated the explanation of many cerebral events. In short, the development of neurophysiology enriched in those years the cultural baggage of neuroscientists, through empiric results, successively proved by experimental studies. The era in which Lombroso lived was yet seen by neuroscientists as a fecund period in which cerebral functions were studied and new knowledge reported. The normality, as soon as the abnormality of brain functions, all were the result of localizing and functioning of anatomical structures. Then, the acts, mood, personality in human, arise from anatomic neurological sites and pathways, that can work normally or be altered. «Mens agitat molem» is an ancient Latin allocution, considering psychic influence of mind over social life and, on the other hand, actually it is known that mental processes depend on neuronal functions, which are a set of neurotransmitter and morpho-structural mechanisms of the brain (Liberini, 2000). So, psychopathologic events are also related to brain alterations, which have various etiopathogenesis, for example, neoplastic, vascular, inflammatory, traumatic, especially affecting some cortical regions, as prefrontal cortex and temporal cortex. Prefrontal cortex is the area of consciousness, voluntary mechanism, ideation and planning, reasoned acts. Temporal lobe, particularly limbic cortex, is the site of memory, emotional processes, responsible of instinctual, primitive acts, as aggressiveness, fear, anger, wrath, insensitivity, indifference. Furthermore, prefrontal cortex and limbic cortex lobe are balanced structures that work in antagonism, the reason and the emotion, whose imbalance may induce the so-called sociopathy, characterized by the pathological contempt of the subject to the rules and laws of society, impulsive behavior, inability to take responsibility and indifference towards the feelings of others, virtually responsible of criminal acts.

Conclusions

Definitely, the morphological aspects in humans have not been relevance for the crime, what matters is what
there is inside, into the brain, not outside. Lombroso’s theories instead emphasized the morphology throughout the criminal human body, whose various stigmata, like those described above, are the expression. Genotype as environmental influence and organic, internal and external brain factors, may be responsible for the crime, that are ugly, dirty, bad or beautiful, clean and good, that is the only way the human neurophysiology will not ignored.

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