means kindness, consideration, the *philanthropié* of the Hippocratic aphorism. That heaven-sent quality the poorest and lowliest of Price Thomas' patients at Westminster and Brompton have learned to be his, given to them in fullest measure, as later the world was to learn he had given it in the same devoted attention to his Sovereign.

His is a romantic and individual personality, he is one who works and plays "with sunshine in his veins." As a golfer, I am told, he is an indifferent performer, and as a motorist he has had one historic crash, but, watching him in the theatre one may observe the complete subservience of the personal to the impersonal: stern self-discipline has taught him to suppress his gay, impulsive nature to the demands of his patient's situation. There one is watching the embodiment of all one's ideals of the classical surgeon—discipline, restraint, concentration—combining to provide an elegance of execution with the rarer power of swift improvisation when the occasion demands. There his students may experience the same aesthetic pleasure as they would enjoy, say, in watching a Hutton at the wicket at Lord's. In each case, one is watching a master-craftsman executing a perfect technique. And, as head of his department, his captaincy, like Hutton's, is dynamic. Each is master alike of the art and the science of his chosen craft.

I have sought, sir, to portray to you the man as I have come to know him. To have enjoyed his company has been at once a joy and a refreshment, wherefore now I pray you, Sir, by virtue of the high office which you hold, to admit him of our company an Honorary Fellow of the Royal College of Surgeons of Ireland.

The President having admitted the two new Fellows, both made the traditional Declaration and signed the Roll, after which ceremony the company proceeded to dine. After dinner, the toast of "The Guests" was proposed by the VICE-PRESIDENT, Mr. A. B. CLERY, to which the newly elected Fellows replied. The toast of "The College" was proposed by Sir HARRY PLATT, in which he conveyed the sympathy of our London colleagues on the day's defeat at Twickenham, coupled with his own assurance of the future success and progress in store for the Irish College.

It had been a memorable evening in the annals of the College.

MESCALINE: APOTHEOSIS OF 'THE DEVIL'S ROOT'

By JOHN PEARSON, M.D.
Instructor in Pharmacology, University of North Carolina, Chapel Hill, U.S.A.

and KENNETH DEWHURST, M.D.
Registrar in Psychiatry, Littlemore Hospital, Oxford, England.

"The meat changed in my mouth into raspberries, and *vice versa*. I could not distinguish a cutlet from a peach."
(*Théophile Gautier.*)

PINK elephants and butterflies in turn conjure up the more bizarre manifestations of alcohol and atropine poisoning. The range of drugs which give rise to similar hallucinations or illusions is vast. The hallucinations may be auditory, visual, gustatory or tactile, depending on the susceptibility of the subject and the choice of drug used to induce them. Some drugs have a tendency to produce predominantly visual hallucinations: such a one is mescaline, whilst marihuana (which stimulated Gautier to write the introductory note) can give rise to aberrations of taste as well as to visual distortions.

Mescaline is a drug which has a venerable and almost ancient history as it played an essential part in the lives of the American Indians before the white man ever landed there. It is the most active alkaloid which may be extracted from a small spineless cactus (*Lophophora williamsii*), native to the northern regions of Mexico and to parts of Texas. The tops of these cacti were gathered with suitable ceremony and dried. The dried product, which has a close physical semblance to a mushroom, was eaten by the Indians during their religious ceremonies. The subject experiences vivid hallucinations, which are primarily visual in nature, involving images of extraordinarily bright and varied colours. There is no soporific action, nor is there a marked general stimulation of the nervous system such as is seen in cocaine intoxication.

Amongst those who give good descriptions of mescaline intoxication are Weir Mitchell[8] and Havelock Ellis[2]; Delay, Gérard and Allaix[1] also give vivid accounts and offer coloured paintings of some of the mescaline-induced visions. Probably the best modern account of the effects of mescaline on his own mind is that of Aldous Huxley[7]. He is not a ' visualiser ', so that bright abstract images were less obvious to him than a completely changed perception of the external world.

These descriptions show that mescaline visions vary in degree and intensity from fleeting spots and patches to a complex filigree of colour which, it has been suggested, represents a projection of the vascular network of the retina. External objects are often seen in unusual colours and with unaccustomed brilliance. It is found that the best visions usually occur with the eyes closed, preferably with a flickering fire in the vicinity (Ellis[2]). Congenitally blind persons do not have visual hallucinations with mescaline (Ormond[10]). Some subjects experience highly organised hallucinations of human beings, tigers, and serpents. Delay *et al*[1]. describe the vision of one of their subjects who saw the experimenter in the stance of Murillo's ' Immaculate Conception ' poised on a cherry. These images occasionally reflect the unconscious fears or guilts, and the past experiences of the subjects. In analogy Ormond draws attention to Macbeth's vision of Banquo's ghost which Lady Macbeth starkly describes as ' the very painting of your fear '. (There is no evidence that Macbeth took mescaline.)

It is largely in the unsophisticated Indians, and in subjects with some mental disturbances, be it only an anxiety neurosis, that the most complex hallucinations occur. Research workers who have taken the drug have, for the most part, experienced pleasantly abstract visions. Huxley[7] relates how he saw his external environment in a wondrous, timeless and transcendental light : to him it was a most valuable experience. Hoch, Cattell, and Pennes[5] tried out the effects of 0.4-0.6 gm. of mescaline injected intravenously into a mixed group of 59 acute and chronic schizophrenics. Control tests were carried out on normal subjects. They noted a predominance of visual hallucinations as compared with auditory hallucinations. The majority of schizophrenic subjects suffered an emotional disturbance which was most commonly a severe anxiety state or a paranoid reaction. Many patients, who had previously been withdrawn and uncommunicative, openly verbalised their mental content; childhood memories were revealed, and in some cases unconscious material, of which they had hitherto been unaware,

was brought to light. Hence some writers have referred to this property of recall induced by mescaline intoxication as condensed psychoanalysis.'

Although many symptoms of mescaline intoxication in normal subjects resemble those of schizophrenics, there are essential differences. Whereas normal persons tend to retain better reality control and to remain somewhat detached observers of the various perceptional changes, the schizophrenic actually *lives* in this world of drug-induced perceptional aberrations which thus reinforces and magnifies the symptoms of his psychosis. Nevertheless Hoch et al.[7] believe that mescaline is useful in furthering the understanding of functional psychoses, although they stress the danger of precipitating an overt psychotic episode in patients in whom pseudoneurotic schizophrenia has been diagnosed. Mescaline may also be of clinical value in accelerating psychotherapy. McKeller and Simpson[9] also agree that experiences under mescaline throw much light on schizophrenic thought, particularly the common phenomenon of 'blocking.'

In addition to visual hallucinations mescaline intoxication produces numerous vegetative changes. Feigen and Alles[5] mention increased tendon jerks; mydriasis; nausea and vomiting; increased size of the visual fields for colour; and disturbances of posture from a slight unsteadiness of gait to a frank Rombergism. Usually normal subjects became extremely euphoric, and body image disturbances were frequent. Weir Mitchell[8] described one such case in which the subject's right hand seemed to be the biggest, or even the only, part of the body. These physical changes are invariably accompanied by alterations in the time sense together with feelings of depersonalisation and derealisation.

It might well be expected that such an extraordinary drug would be held in reverence by the Indians of America. A large tap root makes up three-quarters of the fresh plant: this was why the Christian missionaries to Mexico in the 16th century called the cactus 'the Devil's root.' Francisco Hernandez, a Spanish missionary, writing in 1576, describes the plant thus: "This root scarcely issues forth, but conceals itself in the ground, as though unwilling to harm those who may discover it and eat it." The Indians were more inclined to call it 'God's Flesh': but in fact the cactus or its dried parts had many names, one of the most common being 'Peyote.'

Use of the plant was most vexatious to the missionaries. The taking of it was said to make them lazy, and did not make good Christians of them. In a religious manual of 1760 for use in the confessional among the Indians of San Antonio, Texas, are the following questions to be asked by the priest:

Hast thou eaten flesh of man?
Hast thou eaten the peyote?
Dost thou suck the blood of others?
Dost thou adorn with flowers the places where idols are kept?

Mescaline is still used by American Indians. The U.S. Government tried prosecuting them for it in a celebrated case in 1914 (Shufford[12]). Thomas Prescott, a priest of the Sacred Peyote Society, United Church Society of Wisconsin, defended the practice in the following words: "When I took this peyote, I could see the bottles which used to have

my whiskey and alcohol in: I could see myself lying drunk in the road. That is the way it shows us the bad, and teaches us the good."

Slotkin[13] has in recent years studied the mescaline habit in American Indians. He concludes that " the habitual use of peyote does not seem to produce any increased tolerance or dependence." The subjects do not become fractious and liable to violence as in alcoholic intoxication. Referring to the ceremonies at which mescaline is taken, Slotkin adds: I have never been in any white man's house of worship where there is either so much religious feeling or decorum."

It may turn out that mescaline will make an important contribution, even if indirectly, to modern medicine.

Osmond and Smythies[11] made the significant though obvious observation that the chemical formulae of adrenaline and mescaline were extraordinarily alike. It had previously been noted that some of the symptoms of taking mescaline are similar to those of acute schizophrenia. They then suggested that one of the aetiological agents in schizophrenia might be a substance or substances lying, chemically, between mescaline and adrenaline: this postulated compound should have the psychological properties of mescaline, and should be effective in concentrations nearer those of adrenaline.

Later they collected reports of asthmatic patients who injected themselves with adrenaline and noticed the most extraordinary effects: anaesthetists reported unusual symptoms in patients who had received old adrenaline which had a pale pink colour. Results of investigations showed that the cause of these symptoms was adrenochrome (Hoffer, Osmond and Smythies[6]). This has a chemical structure similar to adrenaline and mescaline, and can be shown to occur in minute quantities in the human body.

Adrenochrome, moreover, has properties such as were looked for by Osmond and Smythies in their postulated aetiology of schizophrenia. It does not have the sympathomimetic actions of adrenaline, but minute doses cause hallucinations virtually identical with those of mescaline. *In vivo* it has an instant action, unlike that of mescaline which may take an hour or more before its effects are marked. Adrenochrome markedly inhibits the intermediary carbohydrate metabolism of cerebral cells. It shows an immediate inhibition of hexokinase, whereas mescaline inhibits this enzyme only after two to three hours incubation. Unlike adrenaline, adrenochrome appears to be able to cross the blood/brain barrier. One can extend the hypothesis that due to stress, and the resultant increased output of the adrenal glands, unusual quantities of adrenochrome may be produced and may cause mental disturbance.

It is interesting at this stage to glance at the chemical formulae of the drugs which are mentioned. One should note that four of them contain the indole nucleus, though mescaline and adrenaline do not. However, it is reasonable to suspect that mescaline undergoes oxidation to form an indole nucleus before its pharmacological properties are manifest. This would be quite analogous to the decomposition of adrenaline. (Yohimbine, a drug prepared from a West African tree, also contains an indole nucleus. This drug, which is said to have aphrodisiac properties, has some hallucinatory effects comparable to mescaline. It is also an adrenergic blocking agent.)

Another drug which has recently come into prominence is lysergic-acid-diethylamide (LSD). This is very closely allied to ergometrine, which has, as one of its properties, an adrenaline-blocking effect. Now LSD has properties very similar to mescaline and adrenochrome. Extensive clinical trials are now being carried out with LSD, a drug with morbid abreactive properties and hence of value in psychiatry.

Mention must finally be made of 'serotonin,' or 5-hydroxy-trytamine. This curious compound which occurs in human serum can elevate blood pressure and act as an antidiuretic. Gaddum and Hameed[4] have recently explored the pharmacology of 5-hydroxy-tryptamine. They postulate the presence of special receptors to this substance, like the well-known cholinergic and adrenergic receptors. They studied this drug on the uterus, ileum and blood vessels of laboratory animals, concluding that there were two types of receptor, as in the case of the cholinergic type. Both types could be stimulated by small doses of serotonin. One of them could be inhibited by excess of the drug. The other could be inhibited by LSD.

Thus LSD and 5-hydroxy-tryptamine have opposing effects in certain circumstances. One must thus be forced to ask the question: "What are the effects of 'serotonin' on patients with acute schizophrenia?" Wooley and Shaw[14] have noted this therapeutic possibility; but they point out that as serotonin cannot cross the blood/brain barrier a search for a compound with a serotonin-like (i.e. antagonistic) effect on the hallucinogenic drug, and possessing the property of attaining the desired distribution in the body, would be more appropriate.

The time is yet early and the pharmacology of these drugs has yet to be investigated exhaustively. However, one may not risk too much in saying that mescaline and its derivatives have at last come into their own.

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