these instances the stage of irritation of the centres had passed farther into that of paralysis. Similarly the temporary restoration to normal when at work of disturbed heart functions from prolonged work in compressed air must be due to hyperaemia of the deeper vessels together with inhibition of the vasomotor centres and through the sympathetic nerve on the heart itself.

Concerning the treatment, I found that nerve sedatives such as bromides, especially ammonium bromide, were better than opiates, and in a severe case of pain cannabis indica gave great relief. Potassium nitrate, potassium acetate, and ammonium acetate are good in the convalescent stage, or when the pain diminishes, but may be given from the first with good results. By far the best treatment is the medical lock, into which, however, a purified air should be pumped till the pain goes, and then the pressure very gradually reduced. To effect this there should be attached to the medical lock an apparatus containing caustic soda in screens over which the air in passing would give up most of its CO₂. Similarly the prevention of the worst form of caisson disease would be effected by getting rid of the CO₂, where it collects in largest quantity, namely, in the shield where the men are working. This was done in the Greenwich Tunnel by running a blow-off tube down to the shield and blowing off the air every hour or oftener if necessary, if the analysis of the air in the tunnel and in the shield given above is examined it will be seen that the carbonic acid was reduced almost a half in volume by this expedient alone.

Finally, all workmen about to be employed in compressed air should be subjected to a most searching medical examination, all new hands should be examined after work each day for a week, and the gang going off and that going on twice each week, and those who are indisposed kept above ground till well; should the pulse have a high tension the man should be kept under observation every day, and should there be a booming sound in the heart or reduplication of the second sound he should be suspended altogether. This entails great labour on the part of the medical officer, but the responsibility of allowing men to work when unfit is infinitely greater, and the freedom of those under his care from a disease of such a distressing nature is a sufficient recompense.

COCAINE INTOXICATION AND ITS DEMORALIZING EFFECTS.

By KAILAS CHUNDER BOSE,
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BESIDES the use of cocaine hydrochlorate as a therapeutic agent its consumption as a drug for intoxication is so great in Calcutta that unless stringent measures be adopted to control its sale, I have reason to fear that its demoralizing effects will soon spread amongst the juvenile members of respectable families, and that at no distant date special asylums will be required for the safety and treatment of cocaine inebriates.

Fortunately, however, the cocaine habit is at present confined to people who are more or less addicted to opium, ganja, or alcohol, but we occasionally come across cases where the victims have contracted the habit *de novo*. We do not know how the people of Calcutta have obtained their knowledge of the intoxicating property of a costly drug which has hitherto been only handled by medical men, but facts tend to show that they have got it from Bhagalpore, where cocaine has become a social necessity amongst the less thoughtful. Inebriates say that the hilarity it produces is almost instantaneous, and is followed by no deleterious results. Novices as a rule take it quite secretly during the early hours of the night, whilst confirmed and veteran eaters consume it during all hours of the day. It is generally taken in the form of tablets or powder and chewed with betel leaves (*Pan*, piper betel) and slaked lime.

Unlike ganja or bhang it requires no special preparation. The habit once acquired cannot be easily given up. The first symptom experienced by the victim after he has taken a dose of cocaine is loss of sensation in the tongue and lips, followed by dryness of the mouth and fauces. A thermometer placed under the tongue does not indicate any rise of temperature.

The approach of the so-called hilarity is announced by a feeling of heaviness of the head, throbbing of the arteries of the neck, and palpitation of the heart. The pulse becomes slightly full and quick, but never exceeds 110. At this stage the inebriate likes to be left alone; he firmly closes his lips and avoids talking, lest, in his attempt to do so, the saliva flows out of his mouth. His ears become hot and red, whilst his cheeks become pale; the tip of the nose becomes cold, perspiration soon breaks out on the forehead and neck, and the height of intoxication is marked by coldness of the finger ends and dilatation of the pupils. This stage lasts from 30 to 45 minutes, after which the victim longs for a fresh dose, and unless he gets it he feels lifeless and dejected. This depression of spirits is more imaginary than real, for I have not noticed any fall of temperature or slowness of the pulse, but the respiration becomes slightly hurried. The tongue and lips now become moist again, and perspiration on the forehead ceases altogether, but the pupils remain dilated. The physiological effects of cocaine are most marked upon novices. The teeth and tongue of confirmed cocaine eaters turn jet black, and this is probably due to the chemical change produced by the action of lime and saliva upon cocaine.

The craving for an increase of the dose becomes irresistibly great, and in one case the dose was raised from 1 gr. to 12 gr. within the short space of a month. Unlike opium, it brings on insomnia and anorexia, soon followed by dyspepsia and diarrhoea. The dyspepsia of a cocaine inebriate is very obstinate and does not readily yield to treatment. Its prolonged use brings on some deafness. The quantity of urine is diminished, but in none of my cases was albumen detected. Delusions and hallucinations often occur, and cause dejection and dread. In some cases cocaine brings on acute mania, which is not amenable to treatment. Amongst numerous other cases I select the following in which the deleterious effects of cocaine upon the system were most marked.

CASE I: *Cocainism following the Use of Opium and Bhang: Gradual Increase of Dose: Diarrhoea: Convulsions: Death.*—L. B. M., a promising boy, aged 20, very respectably connected, fell into bad company and contracted the habit of taking opium and bhang in their various forms. His friends remonstrated with him, and he gave up the opium habit altogether and took a fancy to try the effects of cocaine. A friend of his offered him 1 gr., and its effect, as the young man said, was simply pleasant. He continued to take 1 gr. daily for some time with apparent benefit to his physical health. He then began to take 2 gr. twice daily, and he went on increasing the dose until it was raised to 30 gr. a day. The demoralizing effect of the drug was soon marked upon him: he now avoided society and became solitary. He was honest and truthful before, but now he became a liar and a pilferer. He was fair and strong, but he soon became weak and dark. He suffered very badly from insomnia, and hypnotics failed to give him rest and sleep. He would take nothing for his food except milk in very small quantities. His heart beat was strong, but his hands and feet were cold and clammy. His pupils were dilated, and the conjunctivae looked pale and bloodless; his tongue and teeth were black. Obstinate diarrhoea supervened and carried him off. He had convulsions before death.

CASE II: *Confirmed Cocainism: Plus Sulphonal: Ruined Life.*—S. B., aged 45, a Sanscrit scholar, and versed in Hindu philosophy, consulted me for insomnia, the result of the cocaine habit. As a priest he said he had fast at least three days in a week. About a year ago he had occasion to go to Bhagalpore, where he met a learned Pundit, who advised him to take cocaine, which possessed remarkable power of sustaining vigour and life without food, and enduring fatigue of all kinds. This induced him to take cocaine. At the commencement he derived benefit from its use. Thinking he might further improve his health he raised the dose from 1 gr. to 3 gr. He felt weak and giddy, and consulted another cocaine eater, who advised him to take it twice daily and in pretty large doses. He raised the dose to 5 gr., which he took regularly for three months, when unpleasant symptoms began to make their appearance one after another. He soon felt himself dispirited and miserable; he suffered from anorexia and obstinate insomnia; he lost his memory, and

became dull and stupid. I strongly advised him to give up his cocaine altogether. He promised to do so. After a few weeks he returned to me again and asked for a harmless drug which would act as a substitute for cocaine, as he regretted he could not resist the temptation and had to use cocaine, although he knew well he was poisoning himself. I noted the following symptoms: Temperature, 97° F.; pulse, 110, soft and compressible; heart sounds feeble, regular, no *bruit*; tongue and teeth jet black; sight impaired, lachrymation, photophobia, pupils dilated but respond to light; considerable wasting of the muscles of the body. I gave him 20 gr. of sulphonal to take with milk at bedtime. The next day he reported that he had slept a little, and felt easy. I gave him another dose, and the effect was satisfactory. Now, I hear, he takes sulphonal daily, and has kept up his usual dose of cocaine. He has given up his priestly duties, and mixes freely with low-class people. He lives entirely upon the charity of his neighbours.

CASE III: *The Cocaine Habit Acquired through the Medicinal Use of the Drug: Its Toxicity and Ruinous Power.*—G. A., aged 45, has been using cocaine for the last eighteen months. He was subject to facial neuralgia, and had several of his teeth extracted. He was advised by a cocaine eater to chew cocaine with betel leaf, and he did it with excellent results. This induced him to use it daily, and he thus acquired the habit. At present he takes 8 gr. twice daily. He wished to discontinue its use as he had no further neuralgia, and as the process was very expensive, but he could not do it. The following symptoms were recorded: Pulse 100, intermittent; respirations, 18; temperature, 97° F.; pupils dilated; general weakness of the body, anorexia, insomnia, constipation; mind clear; occasional vertigo and headache; tongue moist and clear, slightly tinged black; has lost all his virile power. To ascertain whether the craving of cocaine inebriates was more imaginary than real, I gave him 8 gr. of sulphonal, telling him that it was cocaine of the very best quality, and more exhilarating than the inferior kind of bazaar cocaine, and did not require any special preparation to produce the desired effect. He called again the next morning, and reported that the new drug had no effect upon him, and he had to take his bazaar cocaine, which gave him instant relief. He is impoverishing himself in order to procure his daily dose.

CASE IV: *The Cocaine Habit in an Opium Eater: Delusions.*—S. L., Burman, aged 52, a confirmed opium eater, used to take 30 gr. of crude opium twice daily, but has now reduced his daily ration to 10 gr. He contracted the cocaine habit two years ago. He first took it for the relief of pain which he was subject to. From 2 gr. he has increased his daily dose to only a few grains less than two drachms. He prefers to take it in the crystal form; says he can take two drachms with perfect safety. He gets his supply from a *panwalla* (betel leaf vendor) to whom he pays Rs. 2½ every day. When he cannot procure money by honest means he robs his wife and children of their jewellery. He was stout and strong before, but now looks pale, thin, and anaemic. He constantly feels a dull heavy pain on the head, and a sense of heat all over the body; perspires freely and suffers from insomnia, for which he sought my advice. Whilst giving the history of the case he suddenly stood up and looked bewildered; he walked to and fro for a few minutes and then sat down. He remained seated for about twenty minutes, and then hastened to hide himself behind an *almirah* which stood near. His friends, who accompanied him, stated that they had noticed this change in him for about a fortnight. I closely watched his behaviour, and did not allow anybody to disturb his movements. He soon came out and sat quietly on the floor. When questioned, he replied that for the last ten or twelve days an evil spirit had taken possession of him, and when he forgot to pay him his due he got annoyed and tried to kill him. He remained with me for more than an hour and a-half and then left the place. His pupils were slightly dilated, pulse 86 good, respiration normal, tongue dark black, pretty moist, cannot distinguish salt from sugar, muscles of the body flabby, tendon reflexes diminished. His urine was analysed, but nothing abnormal was detected.

CASE V: *Physical and Moral Degeneracy.*—B. L. M., aged 33, has been using cocaine in 30-gr. doses twice daily during the last twelve months. He gets his supply from dispensaries.

He was stout before, but has now lost his weight; suffers from anorexia; has not taken any food for the last four days; says he can tolerate fatigue very well; no constipation; absolute insomnia; disturbs his neighbours during night; talks too much, but coherently. Pulse 100, intermittent and feeble. Respirations normal. Hepatic dullness slightly increased. Tongue black; pupils normal; has lost all sexual appetite. At the commencement he was told by his friends that cocaine was a powerful aphrodisiac, but experience has taught him otherwise. He was a broker before, and at one time enjoyed the confidence of his clients. He has now brought ruin upon himself. He takes cocaine daily, about Rs. 2, and this amount he candidly confesses he raises by unfair means. He cannot give up the cocaine habit, although he is fully aware of its baneful results.

CASE VI: *Opium Exchanged for Cocaine: Manner of Consuming the Latter.*—B. K., aged 30, a respectable Hindu gentleman, contracted the habit of taking cocaine for the improvement of his virile power. He was an opium eater before, but gave up his opium habit altogether since he became acquainted with the charming effects of cocaine. He gets his supply from his own medical adviser. From a very small dose of 2 gr. he has raised it to 30 gr. now, and says he cannot resist the temptation of increasing it still further. He consulted me for insomnia, but begged me not to curtail his ration of cocaine. I examined him carefully, and noted the following symptoms: Pulse, 100, weak and small; temperature, 97.5° F.; respirations 18; tongue and teeth black; pupils slightly dilated; lungs healthy; heart sounds normal; liver slightly contracted; no jaundice, spleen normal, urine scanty, but nothing abnormal was detected; has lost all his sexual appetite. It took me about twenty minutes to examine him, after which he became restless and asked me to leave him forthwith, as further delay would likely prove fatal to him. Saying this he sat up, and brought out his cocaine phial and the bowl in which he kept his betel leaves and slaked lime, and commenced taking his beloved cocaine. He took out a silver director, put its spoon end into his phial, and brought out a small quantity, say about 1 gr., put it on the dorsum of his tongue, and then, with the other end, he took out a small quantity of lime, spread it on betel leaf, and putting it in his mouth began to chew it. He then firmly closed his lips; the upper one overlapped the lower lip. He remained silent for about fifteen minutes, and then took out another grain of cocaine, and strictly followed the process observed before. He went on doing this until I left his room. His aunt said that he would not move from the place where he sat until he had taken his full ration. His father informed me that only the other month he had to pay Rs. 50 to his doctor for the supply of cocaine.

CASE VII: *Cocaine in the Zenana.*—A healthy-looking young Hindu girl, aged 16, contracted the cocaine habit under peculiar circumstances. An elderly woman living in the same house advised her to take cocaine to get rid of dysmenorrhoea, which she was subject to. She also cited instances where cocaine proved a sovereign remedy for removing sterility. The foolish girl followed her advice, and took cocaine every day clandestinely in 1-gr. doses for six weeks. She then increased the daily dose, and one day she took 10 gr. Half an hour after she had taken the dose she complained of a choking sensation, and soon became unconscious. At this stage I was summoned to see her. The patient had all the symptoms of hysteria, and I prescribed for her accordingly. When I was about to leave the place the patient had a fit of convulsions, and the anxious father invited me to notice it. She had twitchings of the muscles of the face and general tremor of the body. The fit lasted for nearly three minutes, and was then followed by another after a pause of about ten minutes. It lasted for about three minutes and then left her altogether. Her pulse was 92, pretty good; temperature 99° F.; respirations shallow, 18; tongue, lips, and mouth dry. Pupils slightly dilated. The dryness of the mouth made me a little inquisitive, and I enquired whether she had taken *bang* (leaves of *cannabis indica*) and the reply I received was in the negative. My next question was whether she had had any similar kind of fit before, and the reply was also in the negative. I examined her pulse again and found it to be soft and quiet. Profuse perspiration soon broke out on the forehead and neck and then gradually over the trunk and extremities. Her condition did not im-

prove much and she remained unconscious till the next morning. At about 10 a.m. the following morning marked improvement was noticed in her general condition. She could now understand questions and answer them correctly. Her bladder was full and had to be relieved by catheter. Her pulse and respiration improved and she appeared a different person altogether. At about 1 p.m. she became very cross and wanted to go to the adjoining room where she had her box containing betel leaves and spices. As her friends did not allow her to move she became very irritable. At this time the elderly woman came up and offered her a prepared betel leaf which she chewed; she then became absolutely quiet. During the evening she became again irritable and she herself sent for the old woman, who responded to her call and gave her another prepared betel leaf which instantly calmed her down. This roused suspicion in my mind, and next day when she became worse and wanted to see the old woman, her movements were closely watched. Her husband, under instructions from me, received the prepared betel leaf and made it over to me. On opening the folded betel leaf cocaine was discovered, and then on being questioned the girl made a clean breast of the whole thing, and further said that there were three more girls under the same roof who were taking cocaine in pretty large doses. The enormity of the mischief which cocaine has done and is likely to do can be better imagined than described. The old woman was turned out and the young ladies have ultimately recovered, but one of them has become a confirmed opium eater.

CASE VIII: *Complete Moral and Physical Decadence and Death.*—J., aged 21, a promising young Brahmin boy, living with his relatives, suffered from spermatorrhoea, and on the advice of a quack contracted the cocaine habit. He commenced with a very small dose, and gradually raised it to half a drachm. The pernicious effect of the drug was most vividly marked upon his countenance. He was fair and pretty healthy before, but under the influence of cocaine he became dark and greatly emaciated. He suffered from obstinate dyspepsia and insomnia, for which he sought my advice. He confessed that he had tried but failed to reduce his daily ration, and at last became desperate and determined to resign himself to his fate. His brother, who was his guardian, confined him to a room in his house, and stopped his cocaine altogether. The boy sold his wearing apparel to corrupt the domestic servants in order to get his regular supply through them. He was ultimately turned out of the house. He lived for some time upon the charity of friends. He lost all his energy and intelligence. He suffered from obstinate diarrhoea which did not yield to medicine. He was reduced to a skeleton, his voice was hoarse, pulse soft and quick, heart sounds extremely feeble. Respirations 32, hurried; no râles or rhonchi were detected. Conjunctivae pale, and pupils widely dilated; suffered from vertigo and noises in the ears. Slightly deaf, no inclination for any kind of food. He still takes cocaine, and says his generous relatives out of compassion supply him with funds. Every attempt was made to reform him, but none proved effective. The unfortunate boy eventually died.

CASE IX: *Chronic Dementia caused by Cocainism.*—H., aged 29, an intelligent man, lost his situation by contracting the cocaine habit. He has been addicted to its use for the last five months. Can now take half a drachm of cocaine without feeling any inconvenience. Says he can endure fatigue very well, and walk for miles without fatigue, or any kind of food or drink. Pulse 100, intermittent; tongue jet black. Says the excitement of cocaine is only temporary, and is not worth the expense and trouble. To quote his own words, "To eat cocaine is to court misery." He repents of his folly but cannot resist temptation. He cannot govern his ideas, and loses the thread of his conversation. Dread of being chased by the police maddens him. Whilst loitering on the streets, should he see any white powder he would carefully pick it up and put on his tongue and then throw it down, saying it is not the thing he wanted. He plucks flowers from plants and puts them on his head. He now lives entirely upon the charity of others.

CASE X: *Acute Mania Caused by the Cocaine Habit.*—D., aged 27, a healthy Marwaree gentleman of Bhagalpore, was placed under my treatment for acute mania—the result of

cocaine in which the patient indulged to excess. From his history it was found that previously he was addicted to ganja smoking. By the advice of his friends he gave up ganja and took a fancy to cocaine which at one time was considered a luxury amongst the youth of Bhagalpore. He commenced taking cocaine in 4-gr. doses, but soon raised it to a little less than a drachm. He now takes daily a phial worth Rs. 2½. His friends say that they cannot curtail his dose, as the attempt has on more than one occasion been followed by disastrous results. The patient grew worse, and became more violent and furious. A big dose of cocaine given in the stage of excitement rapidly quietened the symptoms. His sense of taste was absolutely dull, and he could not distinguish salt from sugar, but it was most acute in detecting the adulteration of cocaine, which was at one time intentionally done by his friends to diminish the dose. He talks incoherently and becomes violent when contradicted. His best friends are those who can keep him well supplied with cocaine and betel leaves. He says that the mirth-giving power of cocaine is simply charming. He believes that an evil spirit has taken possession of him, and says that nothing short of sacrificing half-a-dozen men would extricate him from his clutches. His pulse was 86 good, respiration normal, pupils widely dilated, temperature normal. I advised his friends to keep him under restraint, and went to see him on the following day. He took about 10 gr. of cocaine in my presence, and I noticed the following changes. His forehead became hot, tongue and lips dry, temperature 99 F., pulse 86. He remained absolutely silent, and refused to give answers to questions. He was very irritable before, but became absolutely quiet. His constant and favourite attendant told me that he would remain for nearly half an hour in that attitude, and then become incoherent again. As his friends were not prepared to disallow cocaine I discontinued my attendance. It is now nearly twelve months since I saw him last, and I am sorry to hear that he is just as bad as before.

On analysing these cases we find that the action of cocaine upon the nerve centres is slightly stimulant at the commencement, but this effect is only temporary, lasting from fifteen to twenty minutes, and is then followed by a feeling of depression, which gradually passes into complete lethargy and inertia. The power of control is gradually lessened. The virile power is lost. The action of the drug upon the heart and vascular system is depressant. In all my cases irregularity in the rhythmic action of the heart was noticed. The circulation becomes languid. Loss of appetite and failure of digestive power is marked. Emaciation results from want of nutrition. The craving for increase of the dose becomes irresistibly great, the secretion of urine is greatly lessened, and effete materials are consequently retained; the impurity of the blood disturbs the functions of the brain, causing insomnia and loss of memory. Persistent functional disorder gradually leads to structural changes; the victims suffer from delusions, hallucinations, and mental aberration. So long as the inebriates take cocaine in moderate doses, they do not manifest toxic symptoms. Unlike opium, cocaine eaters soon become useless members of society, and at times their lives become a burden to themselves.

To attempt to break the cocaine habit by substituting sulphonal or chloral is to induce the inebriates to consume both. The only remedy lies in locking inebriates up in asylums, and stopping their cocaine altogether. My friend, Babu Brojo Lal Dey, Superintendent of the Metropolitan Institution and College, Calcutta, informs me that he knows instances where students of tender age, belonging to private schools, have become addicted to cocaine, and got so demoralized that they were ultimately expelled the institution. He also mentioned that two brothers, aged 14 and 18 respectively, and belonging to a very respectable Hindu family, contracted the cocaine habit, and indulged to excess. Both of them became insane; the father locked them up and stopped cocaine altogether. In course of time they recovered, and joined their class.

Information has also reached me that women dealing in fancy goods, who have access into private houses, carry cocaine clandestinely, and sell it to girls, who take it in very small doses with betel leaves. The time has come when measures ought to be taken to put a stop to the illicit sale of cocaine.