

plaining of constant pain in his face, limbs, and urethra. The urethral pain had existed for five years, and was consequent upon an attack of gonorrhœa. The patient was a well-built athletic man of forty. He had had several severe attacks of malaria. His knee jerks were excessive, and his pupils unequal. He had a frequent desire to vomit, and complained of pins-and-needles sensations in his limbs, which he described as "feeling like small grains of glass fixed in his muscles." He had lost all sexual power. There was no swaying gait, and no residual urine. Believing that his nervous system was thoroughly demoralised by malaria, and that under these circumstances a urethral granulation might have induced and augmented the continual neuralgia he was suffering from, I proceeded to pass an endoscope and examine his urethra. Before doing so I applied, in the ordinary routine fashion, a few drops of a 20 per cent. solution of cocaine to the canal. In about 60 seconds he exclaimed that the neuralgia in his face and limbs was leaving him, and in 120 seconds he was completely free from the pain, which he assured me had been so constant a source of anxiety as to cause him to resign an important and lucrative official position. I found a granulation patch (?), and cauterised it lightly. He rapidly recovered, and, I believe, returned to Serbia in anticipation of the then approaching war.

The question that was thus forced upon me was this: Are we able to reduce pain in any part of the body by means of a topical application of cocaine to an absorbant mucous membrane like the urethra? To obtain a perfectly unbiased answer I examined the effect of cocaine upon a large series of decapitated frogs, taking them in spring, summer, autumn, and winter; for, as it is well known, their reflex excitabilities vary according to the period of the year. The frogs were decapitated and their toes dipped into a standard solution of sulphuric acid (2 in 1000, Turck). The length of time elapsing before the leg was twitched out of the fluid, and protective movements were made, was noted. Usually this reflex excitability is manifested in .008 to .015 seconds. A few drops of

a 20 per cent. solution of cocaine were now gently thrown into the cloaca so as to inject the bladder and rectum, and the leg was again dipped into the standard solution. The reflex excitability was found to be greatly diminished. Thus the leg was not withdrawn until after 20, 30, 60, or even more seconds. After many control experiments I concluded that cocaine was possessed of considerable reflex inhibitory powers. I now worked with stronger acid solutions, and found that cocaine exerted less and less inhibitory control as the strength of the acid solution was increased—i.e., as the stimulus increased. Thus, the leg was almost *immediately* twitched out of a 1 per cent. solution of sulphuric acid, although a vesico-rectal injection of a 20 per cent. solution of cocaine had been administered. With stronger solutions it was evident that cocaine could not prevent the consciousness of the spinal cord nor repress the manifestation of reflex excitability. My conclusions and indications for clinical research were therefore as follows:—

1. The application of cocaine temporarily abolishes the consciousness of *weak* stimuli, such as would correspond to slight nerve irritations, neuralgias, &c.
2. The application of cocaine has no power whatever over stronger stimuli, such as would correspond to the pain of carcinoma, inflammation, &c.

I now returned to my clinical field and treated over a hundred cases of neuralgia pains in various parts of the body. In all cases in which the pain was slight and the causes trivial, a freedom from pain was produced in from 30 to 180 seconds by the injection of a few drops of a 20 per cent. solution of cocaine in the urethra. The following are picked illustrations.

CASE 1.—A man entered the out-patient department with a wry neck. Although his discomfort was evidently great, yet he suffered but little if he kept his head resting on his right shoulder. Directly he attempted to bring his head to its proper vertical position severe clonic spasms were induced in the muscles of the face and neck, and he shouted with pain. He stated that he had been forced for three months to sleep propped up in