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#### THE INFLUENCE OF CERTAIN DRUGS ON PHYSICAL STRENGTH AND ENDURANCE.

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There are certain drugs which have a great reputation for increasing physical endurance. These are chiefly coca, caffeine, and kola nut, and there are certain other chemical compounds of analogous composition which are derived from muscular tissue and have been found experimentally to have a similar effect. These are chiefly creatin and hypoxanthin. The chemical relation of all these substances is very interesting. Strange to say, some are themselves the products of muscular waste. It will be noticed also that creatin and hypoxanthin occur in beef tea, which is so well known as a general restorative and as a nervous stimulant, and there is ample experimental proof that it assists muscular power. The chemical relationship of the alkaloids found in tea, coffee, kola, and coca to the products of muscle-tissue metamorphosis suggests that these products are either replaced in the muscular tissue by these drugs, or that the products act on the nervous system either as a food or as a stimulant, and are merely supplemented in their action by the drugs. It is a very interesting question whether these alkaloids act locally on the muscle substance or upon the central nervous system.

As we know that tea, coffee, cocoa, and beef tea sustain and strengthen the nervous energies when they have been exhausted by other than prolonged muscular action, the inference is that these substances, as well as the analogous products of muscular tissue, act also directly as food or stimulant to the nervous centres. I have tested and found by experiment the powers of caffeine in increasing the respirations, and in strengthening as well as increasing the rapidity of the heart's action.

The following statements have been made by different writers as to the value of these substances.

*Coca*.—"Enables a greater amount of fatigue to be borne with less nourishment, and it lessens the difficulty of respiration in ascending mountain sides."—*Markham's Peruvian Bark*.

"The leaves are chewed to appease hunger and support strength in the absence of food, and used generally for the stimulant and narcotic effects of tobacco and alcohol."—*Practitioner*.

"It is of use to steady the nerves of excitable persons—to a sportsman in shooting, for example; to give endurance. It is used by travellers in Bolivia and Peru, to counteract the effect of rarefied air on mountains."—*Lancet*.

"In small doses it is said to lessen fatigue and enable the Indians in Peru to make long marches, and a similar result has been obtained in trials upon soldiers in Germany."—*Lauder Brunton*.

Experimentally, coca appears to act in small doses as a stimulant to the nervous system, affecting first of all the cerebral hemispheres, next the medulla, and lastly the spinal cord. It lessens the feeling of fatigue, but the only men' effect seems to be an exhilaration of spirits. Like caffeine, it increases the rapidity of the heart-beat and raises the blood pressure.

*Caffeine*.—Experimentally, caffeine has been found, in small doses, to quicken the respiration and also the pulse. It seems to affect the accelerating centre directly, as its action is equally well defined after the nerves have been divided. Besides increasing the rapidity of the heart's action it seems also to strengthen it, and it raises the blood pressure. Caffeine also seems to lessen tissue change and waste. In addition, caffeine appears to have some power in paralysing the conducting power of the sensory parts of the spinal cord, and it may be in this way that it relieves the sense of fatigue. At the same time, however, it is found to increase generally the functional activity of the spinal cord.

"The peculiar wakefulness, the increased mental activity, and the often nervous restlessness which are induced by strong coffee are familiar to almost everyone. By doses of two or three grains of caffeine a very similar state of the body is induced. The increase of brain power which has been noticed by various observers, as well after caffeine as after coffee, tea, guarana, and all the allied crude drugs, is undoubtedly real, and must be due to a direct stimulant action on the cerebrum. It appears to me that the cerebral stimulation of caffeine differs from that of opium in that it affects the reasoning faculties at least as profoundly as it does the imagination. Coffee prepares for active work both mental and physical—opium rather for the reveries and dreams of the poets. The enormous use made by mankind of substances containing caffeine indicates that in some way it is directly of service in the wear and tear of life."—*H. C. Wood*.

*Kola (Sterculia acuminata)*.—A native of Tropical Africa. The nuts from this tree are used to support the strength, allay the appetite, assuage thirst, and assist the digestion. They have also a reputation for increasing the capacity to bear prolonged fatigue.

The kola nuts contain a large percentage of the same chemical principle, theine, as is contained in tea and coffee. They also contain an aromatic volatile oil to which some of their properties must be attributed.