

In regard to the apparatus, nothing more is needed than a vessel to hold the water, a double catheter, and sufficient india-rubber tubing to convey the water to and from the bladder. The flow may be regulated either by a stop-cock attached to the reservoir, or by some compression of the tube. The position of the vessel should be such as not to cause pain by excessive pressure, but it is desirable that the bladder should be fully distended at times, in order that the whole surface may be thoroughly cleansed. Patients may learn to do this by simply compressing the efferent tube from time to time. The quantity of water needed is about a barrel in the twenty-four hours.

ERYTHROXYLON COCA.

BY G. ARCHIE STOCKWELL, M. D.

COCA is the dried leaf of the shrub *Erythroxyton coca* or *Erythroxyllum Peruvianum*; order, trigynia; class, decandria; habitation, mountainous districts of Peru and Bolivia, two thousand feet and upwards above the level of the sea.

To the native Peruvian and Bolivian coca holds the same relation as the betel-nut to the Malay, the tea-plant to the Celestial, poppy and Indian hemp to the Oriental, and tobacco to the Caucasian. To it he is as much the slave as were Dr. Johnson and Gilbert Stuart to rappee. Beyond the confines of the country to which it is native but little seems to be known of coca; nevertheless it is, without doubt, one of the most remarkable products of the torrid zone. When we consider its peculiar properties, it is astonishing that it has so long remained unnoticed. Were it a product of the jungles of interior Africa, or extremely difficult to obtain, this neglect could be accounted for; on the contrary, hundreds of European and North American vessels annually frequent the harbors of Peru and Bolivia, or the metropolis of the Amazon, where it may be obtained in large quantities, and where it has been as long known as the cinchona; yet the tonic, stimulating, and narcotic properties of this shrub are just beginning to attract the attention of the medical world.

Like the cinchona, the peculiar powers of coca have been introduced to the notice of the Caucasian by the aboriginal inhabitants of the country to which it is indigenous. No historical record informs us when it was introduced to their notice, or who first discovered the hidden properties of its leaves. When the empire of Atahualpa was overthrown by the rapacious Pizarro, coca was as well known to the Peruvians as at the present day, and played an important part in their religion, being used in all public ceremonies as an offering to the sun god.

Although found in a wild state, like most other shrubs it is enhanced

in value by cultivation, and hence none but the carefully nurtured, domesticated variety finds its way to market. The sultry valleys of the eastern slopes of the Andes are most favorable to its growth, and it is here that a most systematic method of cultivation is adopted, the plant being raised from the seed. When the young shoots have attained a height of about fifteen inches they are transplanted in rows a foot or more apart; when full grown they rarely exceed sixty-four or seventy inches in height. As it thrives best in damp situations, sheltered from the sun, it is customary, when such localities are not available, to plant maize between the rows because of its rapid growth, its leaves soon furnishing the required shelter. Certain species of palms are used for the same purpose. If no rain falls, the shrublets are subjected to copious and repeated drenchings. Like the coffee-tree, coca has a lustrous green foliage with white blossoms, which ripen into small red, or rather scarlet berries. When the shrub has attained an age of eighteen or twenty months the foliage is stripped for the first time, the leaves now presenting an appearance not unlike those of the tea-plant, being oval, pointed, and two or two and a half inches in length, with half that breadth at the widest part, and furnished with short, delicate footstalks; unlike those of the tea shrub, they are not dentate, and may be readily distinguished by a curved line running from base to apex upon either side of the midrib. The foliage is known to be ripe for plucking when the leaves become sufficiently brittle to break upon bending. After stripping, the leaves are spread out to dry upon woolen blankets in the sun, great care being taken to prevent absorption of moisture, which is known by the leaf acquiring a brown tinge; when properly cured it retains a pale-green color. When the curing is completed the coca is packed in bundles or sacks of an *arroba* (twenty-five pounds) each, and carefully covered with dry sand until desired for the market.

The naked shrub soon produces a new foliage, which in turn is ready for plucking in three or four months; so that in favorable situations three or four crops are gathered each year from the same shrub, but in the higher altitudes the planter must be content with a single crop. With proper care the shrub is productive for forty or fifty years without the *cocales*, as the plantations are designated, being renewed. The only enemies of the plants are the ants and moisture. The former are much more troublesome pests than with us, and speedily destroy a plantation, while the latter either entirely spoils the dried leaf or renders it of inferior quality. When well dried the leaves possess an agreeable odor, with a slightly bitter aromatic flavor, closely allied in taste to inferior green tea.

Although there is little or no foreign demand for the article, the local consumption is immense. Not only do the Indians of Peru and Bolivia esteem its use as one of the prime necessities, but it plays a most im-

portant part in the economy of life with a goodly portion of the white population, and also of the choloes, mezitoes, and negroes, who are never seen without the leathern pouch in which to carry the leaves, and the attendant gourd holding powdered unslaked lime, the sharp ashes of the quinoa, molle-tree, or those of the plantain. Three times a day at least will the *coquero* suspend all labor to indulge in his favorite luxury. Taking a few leaves from his pouch, he removes the midrib, and carefully masticates them into the shape of a small ball which is known as the *acullico*; then, withdrawing the wooden stopper of the gourd, he conveys to his mouth by means of a sharpened stick a small portion of the alkali, and repeatedly stabs the *acullico* until the desired flavor is obtained, at the same time avoiding all contact with his lips; when the two are thoroughly incorporated, the *coquero* lies upon his back with half-closed eyes and gives himself up to the full enjoyment of rumination for about forty minutes. So accurately is this time observed that the Indians, when traveling, measure distance by it, one *coceada* being about equal to the time occupied in walking two English miles.

It is a remarkable fact that those who regularly use the coca require but little food, and with increased indulgence are enabled to undergo the greatest fatigues without tasting anything else. Pöppig ascribes this astonishing increase of endurance to a temporary excitement, which must necessarily be succeeded by a corresponding collapse, and therefore asserts that the use of coca is highly injurious. This is in accordance with the exploded attempt to apply the dynamic law that "action and reaction are equal and opposite" to the phenomena of stimulation. Those who are ignorant of the physiological action of stimulant narcotics repeatedly affirm that tobacco, opium, hemp, alcohol, coca, and kindred drugs which are used as stimulants produce a corresponding recoil, whereas the so-called recoil is simply the advent of narcosis, owing to a large impregnation of the blood with the agent after stimulation from a small dose. Coca never produces a depressing action, except as the result of an overdose or of small quantities so frequently repeated as to cause the narcotic effect by accumulation. Careful observations lead me to believe that, so far from being injurious, the moderate consumption of coca is not only wholesome but frequently beneficial. Tschudi cites as examples several Indians who, never allowing a day to pass without at least three *coceadas*, attained the truly patriarchal age of one hundred and thirty years. As the ordinary food of the native Peruvian consists almost exclusively of roasted maize, barley, or seeds of the quinoa, which are eaten without any addition, they suffer with frequent and obstinate obstructions and derangements of the digestive system, which are entirely obviated by the use of coca. From the time the native becomes a *coquero* these troubles cease, never to recur, except with the abandonment of the habit.

Travelers in the Andes have found in coca a preventive of those asthmatic symptoms that are produced by the rarefied air of high altitudes. Tschudi invariably drank a strong infusion before undertaking his hunting excursions in the Puna, fourteen thousand feet above the sea level, and not only found it to afford great relief, but asserts that he suffered no greater difficulty in breathing while in the rapid pursuit of game than would have been the case upon the coast.

Although the moderate use of coca is thus beneficial, its abuse is attended with serious results, and if persisted in the digestive functions are deranged, and there is brought about a structural degeneration of nerve material, the consequences of which are to be seen in delirium, brain softening, and general paralysis. The permanent pathological effect induced does not allow of as ready an impression by the drug as before; hence the coquero continually demands more and more of his accustomed narcotic to produce the desired effect. Such a man may be readily distinguished by his trembling limbs and hollow cheeks, his sunken, lustreless, black-rimmed eyes, sallow complexion, incoherent speech, and stolid apathy; seemingly oblivious to all surroundings, he neither notices a friend nor fears a foe. His character is irresolute, suspicious, and false; in the prime of life he has all the appearance of senility, and in later years he sinks into complete idiocy. With the confirmed coquero no increase of temperature or acceleration of the circulation is induced by the use of the drug; on the contrary, the heart's action is slow and intermittent, and the pulse thin and thread-like. The forehead is frequently clammy and cold, while the extremities may be at a fever heat. The symptoms point strongly to the medulla oblongata as the part affected, which undoubtedly becomes partially paralyzed. In moderate doses, coca causes increased arterial action, stimulates the alimentary secretions and peristaltic action, diminishes weariness, strengthens the pulse, calms nervous excitement, retards waste, facilitates repair, alleviates spasms, and increases mental activity; in fact, it is an economizer of vital energy and an effective aid to nutrition. It invariably contributes to mental cheerfulness, and withal not unfrequently causes unequivocal aphrodisia. Although one cannot look upon coca as a food, it will be found second only to alcohol in its food-replacing power; for this reason it will undoubtedly prove of value in low forms of fever. In larger doses it has a decided action upon the kidneys, producing also watery stools, and, when long continued, gives to both urine and fæces a highly offensive odor, and renders the latter so acrid as almost instantaneously to destroy all vegetation with which they may come in contact; it also renders other excretions, as those of the lungs and skin, offensive. In these large doses it does not seem to affect the visual organs, as the pupils will be found freely contractible on the approach of light, and unless the doses are very heavy the eye presents an ex-

pression of combined merriment and cunning. Hunger seems never to be induced, but rather the contrary; yet if the patient be coaxed to partake of food set before him he eats voraciously.

According to one writer, loosened teeth with foul, ulcerous gums are among the effects of prolonged coquerism, and he cites as instances the Indians employed in certain of the mines of Peru, who, he discovered, not only consumed enormous quantities of coca, but "were afflicted with ulcerous gums, foul breath, and loosened teeth, the sufferings from which could only be allayed by death." The writer in question must have been woefully ignorant, or he has wantonly endeavored to mislead his readers, as the mines in question were the famous quicksilver workings of Peru. He speaks of them as silver, but ignores the fact that it was not argentiferous metal that was obtained, but mercury.

Of the physiological and therapeutical action of coca there is much to be discovered. It has been lauded as a hypnotic, yet its uncertainty of action will prevent its ever superseding the many other drugs of far greater value that we possess. It is, however, both anodyne and antispasmodic, exerting special influence upon the brain and spinal cord, and from its action upon the pneumogastric it will undoubtedly prove of benefit in certain forms of asthma. Its antispasmodic action has been vouched for by numerous South Americans. It is used by the natives to promote uterine contraction. Where inertia has supervened, I am told by Spanish American physicians that its effect is both speedy and certain. In melancholia, or where nervous depression exists, its action in promoting cheerfulness is marked, and its influence upon the digestive function, before noticed, will doubtless cause coca to be prescribed for many of the diseases of so-called dyspeptic character and those irregularities arising from non-assimilation of food.

It is said that certain of the Bolivian Indians inherit from their ancestors a mode of preparing and administering this drug so as to produce a cataleptic state so profound as to simulate death beyond detection, from which the patient may be aroused after the lapse of a few hours without serious results. I believe a mixture of cannabis indica, opium, and certain other narcotics is used for the same purpose by the initiated among Orientals.

Coca will produce sleep oftentimes when opium has failed if given in repeated small doses for a little time before retiring to rest, in order to allow the preliminary stage of excitement to pass off; but, as a rule, it is inferior to the opiates, its action being extremely variable.

For the last few years it has been fashionable to claim for every new drug a decided antiperiodic action, vaunting for it all the powers of quinia, and coca has not escaped. A careful and thorough experimentation with the drug will, however, convince the most incredulous that it possesses no antiperiodic properties. Administered in conjunction

with quinia it will, I doubt not, like opium, oftentimes prove a valuable adjunct. Give quinine to a confirmed coquero, at the same time depriving him of his solace, and you will frequently be disappointed in its results. Restore him his coca, and the action of the salt will be both speedy and certain. I have observed like results when prescribing for consumers of tobacco.

From the action of coca as observed, the writer would give it to a patient suffering from cholera with the expectation of happy results; its action is rapid, and vomiting and cramps would, I think, speedily yield to its influence. Larabie, Williams, and other travelers have experienced almost instantaneous relief from coca when suffering from cholera morbus. Dr. Carvallo informs me that he has observed similar results from an infusion, and has known even the chewing of the leaf to act favorably. I have witnessed the same effects myself. It would not be at all surprising if it were proven that the coca caused a marked increase of the biliary secretions. I should also expect marked results from it in congestive chills, particularly with flannels wet with ammonia spirits in which quinine had been dissolved to saturation, applied to the abdomen, as practiced in Central America. But it is in hypochondriacal diseases that we may look for the greatest benefit from coca.

I trust that the profession will thoroughly examine into the merits and demerits of the article, and give the full negative results of their investigations. I say *negative*, for that is the evidence demanded at the present day. We are overrun with positive evidence, all virtues being ascribed to all remedies to such an extent that we become lost in seeking information. What we now need to know is what medicines will *not* do.

It will probably be found that the dose required for our climate will be much larger than that demanded in Peru. The best mode of administering is in the form of an infusion, the dose being about two drachms. The greatest drawback to its use is the liability to gather moisture, which renders it worthless. The fluid extract I would have but little faith in, for obvious reasons. If an extract be made of erythroxyton coca one pound, rectified spirit four pints, prepared by maceration for seven days, pressing out the tincture and evaporating to a proper consistence, I think it would be satisfactory. The dose of such an extract should be one fourth of a grain to two grains or more.

A NEW SYRINGE PISTON.

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A GREAT fault in hypodermic syringes as hitherto constructed is the rapid drying of the piston. As soon as the oil with which it is saturated when manufactured is removed by use, it dries so quickly that a