tively insoluble proteid casein and the fats of milk entangled with it. True coagulation of milk is brought about by rennin, an enzyme of the gastric juice. Other curdling agents can also act upon milk, but the changes are not the same. The so-called "spontaneous coagulation" or curdling of milk from souring is not true coagulation, but merely the precipitation of caseinogen. If milk is allowed to stand exposed to the air at a warm temperature, the lactic-acid bacillus soon decomposes the lactose or milk sugar with the formation of lactic acid. When this acid reaches a certain amount, it causes a *precipitate* of caseinogen and fat. True coagulation consists in the conversion of caseinogen into the comparatively insoluble proteid casein, but acids do not produce this change.

The action of rennin in changing the soluble proteid caseinogen into the more insoluble casein is not a simple one. The caseinogen is split up into two parts: the comparatively insoluble casein which forms by far the greater part, and a very small amount of a freely soluble proteid resembling a proteose, called "whey proteid" by Hammarsten. This change is comparable to the change which takes place in fibrinogen in clotting of blood. The fibrin ferment acts upon fibrinogen, splitting it up into the coagulated proteid fibrin and a soluble globulin which passes into solution in the blood serum. The coagulation of milk is further analogous to that of blood in that lime salts are absolutely necessary for the chemical changes, and clotting does not occur when they have been removed by dialysis or the addition of a soluble oxalate. The changes, however, are not identical. In the coagulation of blood the lime salts first combine with a nucleo-proteid to form fibrin ferment, and this then acts upon fibrinogen, splitting it up into a soluble and an insoluble proteid. Rennin first acts upon caseinogen, even in the absence of lime salts, to form a "soluble casein," but no curdling occurs. The enzyme may then be destroyed by boiling, but the addition of a lime salt causes coagulation instantly. The lime salt unites with soluble casein to form insoluble casein.

The caseinogen of human milk is different from that of cow's milk, and forms a flocculent curd with rennet instead of a solid mass.

The curdling ferment of the pancreatic juice produces a peculiar kind of casein, called "pancreatic casein" by Halliburton, which is not the same as that formed by rennet. At the body temperature it forms with cow's milk a granular precipitate and not a coherent clot as rennin does. The removal of lime salts only slightly hinders but does not prevent this curdling. The precipitate differs in its solubilities both from caseinogen and casein, and it can still be converted into true casein by rennin.

Extracts of various tissues, as the testis, muscle, and liver, as well as the juice of certain plants, cause curdling of milk probably in much the same way as does this unnamed ferment of the pancreatic juice.

As stated above, the curdling of milk from souring is not true coagulation. This precipitation of caseinogen, carrying the entangled fats with it, can be brought about by other acids, *e.g.*, by the cautious addition of acetic acid. The precipitate resulting from the addition of an acid is usually flocculent and contains less lime than that formed by rennin. It can form even in the absence of lime salts, and is more easily redissolved than is the curd containing true casein. Moreover, it can be dissolved and recurdled by rennin, *i.e.*, converted into true casein. Although true casein can be dissolved, it cannot be recurdled by rennin. This is the most striking difference between caseinogen and casein.

Although the lactic-acid bacillus does not cause true coagulation in the ordinary souring of milk, some bacteria, either by their life activity or by some product of their metabolism, produce a coagulum which appears to be a true clot. This fact is utilized by bacteriologists to distinguish between different kinds of bacteria, but probably occurs only under ordinary conditions in those very exceptional instances when a ropy or stringy clot forms in milk.

C. Coagulation of Muscle.—Rigor mortis, or the rigidity of death, is due to a coagulation of muscle proteids. If the muscles of cold- or warm-blooded animals be freed from blood and mixed with ice and salt, or extracted with a rather strong solution of neutral salt, a clear muscle plasma containing most of the proteids of muscle can be obtained. By raising the temperature in the one case or diluting with water in the other, a coagulum consisting of myosin is formed from the proteids that were in solution and separates from a clear serum. Myosinogen, a globulin-like body which constitutes about eighty per cent. of the proteids of muscle plasma, is converted into myosin. Paramyosinogen, another globulin which is only one-fourth as abundant as myosinogen, is also contained in the clot. Small amounts of other proteids (myoglobulin and myo-albumin) remain in solution in muscle serum. The formation of myosin results from the action of a myosin ferment upon myosinogen. This enzyme can be extracted from muscle in the same way as fibrin ferment is obtained from blood serum. The two, however, are not identical, for fibrin ferment cannot coagulate myosinogen, neither can myosin ferment coagulate fibrinogen. Free lime salts do not appear to be necessary for the formation of myosin. Myosin is much more soluble than other coagulated proteids resulting from the action of enzymes, and is often classed with globulins because of the ease with which it can be dissolved by saline solutions. Further, the difference between myosin and the mother substance from which it is formed (myosinogen) is not so great as in the other cases. In the coagulation of muscle, CO_2 and lactic acid are formed, probably from the chemical changes taking place in the proteids.

The appearance of rigor mortis in the muscles is due to these same chemical changes that have been described in muscle plasma. The rigor often disappears before putrefactive changes appear. A proteolytic ferment has been found in dead muscles, and this is probably greatly aided by the lactic acid in causing the myosin to disappear.

The presence of acids, stopping the blood supply, or heating the muscle will cause coagulation that is often called "acid-" or "heat-rigor." In the cold-blooded frog 40° C., in the mammal a temperature of 48° to 50° C., will cause heat rigor. This is probably only the premature appearance of rigor mortis in the dying muscle. It is entirely different from heat coagulation, as the myosin can be dissolved by solutions of neutral salts, while proteids coagulated by heat cannot. Further, the other chemical changes are the same as in rigor mortis, and the myosin formed is still coagulable by heat.

William S. Carter.

COAGULATION NECROSIS. See *Necrosis.*

COAL GAS. See *Carbon, etc.*

COCA.—*Erythroxylon.* "The leaves of *Erythroxylon Coca* Lamarck" (U. S. P.).

(Owing to their important bearing upon the value and uses of this drug, we find it necessary to discuss in some detail portions of its history which in the case of most drugs are practically unimportant. The several departments are indicated by small capital side-headings, so that the reader can readily refer to any desired portion of the subject.)

Definition.—The limitations of the official definition are by no means clear, though highly important. The different varieties of the coca leaf vary in qualitative action to a degree not recognized in our best text-books and appreciated by very few practitioners. If the one plant is to be regarded as a mere form of the other, then the definition includes two drugs, sufficiently distinct to receive recognition under two titles, as is certainly true of the British Pharmacopœia definition, which says: "The leaves of *Erythroxylon Coca* Lam. and its varieties." If, on the other hand, each is to be regarded as a distinct species, then that leaf which appears to be of the higher

medicinal value is excluded from the Pharmacopœia in the interest of one yielding a larger percentage of crystallizable cocaine. There are various good reasons for taking the latter view, so that in this article Coca (U. S. P.) will be regarded as only that variety known as the "Huanuco," or "Bolivian," or "Large Brown" leaf (Fig. 1387). Of this there are noticeable forms or grades, but these may be regarded as differing in degree rather than in kind. Thus, the best Bolivian (Yungas) leaf is rather smaller than the same grown in Peru. The term "Peruvian" is too indefinite for use, as it may reasonably be applied to either this or the Truxillo variety. When we have quite finished with the article thus defined, attention will be given to the Truxillo variety and to other species of the genus.

Origin.—There is no reasonable doubt that the species originated upon the eastern slope of the South American Andes, probably in Peru. Since it was cultivated in prehistoric times, there is no way of certainly ascertaining whether it was wild in its present form or whether the latter is a product of development by cultivation from some other wild form. The latter is probably true, because in the wild (escaped) state it shows a strong and rapid tendency to lose its characteristics. It is impossible to say of any of the wild plants collected by the writer and others that they are not escapes from cultivation, many known to be such having been encountered. Lastly, it is not known whether the ancestral form is one of those still in existence in a wild state.

History.—The coca plant was under cultivation at the time of the discovery, and no clew to its introduction to cultivation could then be, or has since been, obtained. It occupied an important place in the religious and mythological history of the people. This is of interest here only because of the unquestionable fact that such esteem was the result of an appreciation of its useful properties, rather than, upon the contrary, and as for centuries believed, the superstitious reason for its being used. We may therefore dismiss its mythical history (see "Coca at Home and Abroad," *Ther. Gaz.*, March and May, 1888, also p. 14, 1886) as being here unimportant, and consider its physiological and therapeutical history. Its expectorant, sialagogue, stomachic, carminative, emmenagogue, and aphrodisiac properties are among the minor ones for which it was and is used by the natives. As a stomachic, it is recognized that its use before meals detracts from the appetite, but that its use thereafter relieves any discomfort resulting from excess, while not appreciably inhibiting digestion. In fact, its general repute is that of aiding digestion. The more important objects of its use are as a limited cerebral stimulant, an anæsthetic, a very peculiar muscular stimulant, and an ordinary masticatory. As a cerebral stimulant it filled the place of coffee. It was used before the latter was introduced, and after that event it continued to be used by the natives, while the much more expensive coffee was used by the foreign element. In this direction its characteristics were to promote cheerful and hopeful views and sentiments, without excitability, but rather with increased calm. As an anæsthetic, its use was a general more than a local one, though it was locally applied to ease pain, and its carminative and stomachic uses were clearly of this nature. The object of overcoming the pains of hunger and of fatigue were pre-eminent, while that of securing relief from pain by a mild general anæsthetic, in spite of increased wakefulness, was general.

The term "muscular stimulant" is not accurate, but is used for want of a better. More lengthily stated, the plant was used to enable man to perform more labor with less fatigue and with less nutrition. Without regard to the facts of the case, this was the belief of its users. In consequence of these effects, bodily or mental, they performed almost incredible physical tasks, long-continued, upon a food supply, the scantiness of which is equally astonishing, and with results not injurious beyond causing temporary inconvenience. The special adverse conditions to be met in these efforts were the continued scaling of steep and high acclivities, with little food and with a very scanty supply of oxygen, and under the necessity of either attaining a high speed or transporting heavy loads.

The above statements, in substance, were among the earliest historical records promulgated concerning its use by the people of the countries concerned, and they have been repeated, with assurance, by all subsequent investigating travellers. Many of these travellers went to extraordinary lengths to test their accuracy, and always with affirmative results. Travellers and foreign residents verified them by personal experience and very frequently relied upon them for personal help. These assertions were met abroad by religious opposition because of the heathen relations of the coca customs, by very great professional conservatism, and, lastly, by discredit because the leaves, exported for use, largely failed, in the condition in which they were received, to verify them. All the present important uses of the drug in its own form, or in that of cocaine, cannot be said to cover the same ground involved by the native uses of coca leaves. There appears to be but one rational explanation of this broad discrepancy, namely, changes in properties which the leaves undergo after being dried. This view has been verified by the writer by numerous assays of the leaves soon after collection, compared with others made later. Preparations made upon the spot have also been found, by extended trial, to act more like the leaves as chewed by the natives than like preparations made from the exported leaves.

The details of the method of use have been so often published that any account of them appears scarcely necessary in this article. The use of *Llipta*, or ashes, with the *bolus* is to be regarded partly like that of condiments, especially of salt as such, without food. At the same time, the suggestion made by Holmes that the effect of this alkali is to decompose the alkaloid, cocaine, developing new constituents which exert the desired physiological action, is full of food for thought and experiment.

Cultivation and Production.—The product in use proceeds wholly from cultivated plants. Leaves from wild plants are unfit for use. Its cultivation is generally like that of the coffee and tea shrubs. Details will be found in the article last cited. Cultivation is very extensive in Bolivia, whence large quantities are exported to Peru for native use, in addition to the large quantities there produced. The annual consumption is to be stated in tens of millions of pounds. It is comparatively little grown outside of the two countries named, the product of Ecuador, Colombia, Venezuela, Brazil, India, Java, Mexico and other countries being chiefly of the other kinds. There is no point in the United States where the climate would admit of its being grown satisfactorily, though it would probably do well in the mountains near Santiago de Cuba.

The Coca Plant.—The shrub grows from five to eight feet high and is widely branched. The trunk may ultimately attain a thickness of four or five inches, and it, with the larger branches, soon becomes shaggy with gray lichens. The twigs soon become scaly with the closely set, stiff, almost spinose persistent stipules, and are densely leafy toward their ends. The small white or cream-colored flowers grow in little fascicles, close against the bark, on the older and leafless parts of the twigs. They are followed by an investment of ovoid, slightly inequilateral, smooth drupes, which become about a fourth of an inch long and of a deep-red color. The first crop of leaves can be gathered at about two and a half years from seed, and the shrubs bear well for twenty or thirty, or even forty, years. There are no definite months for picking, the condition of the leaves determining the time. Their development at the tip of the twig is continuous, and if allowed, they would as continuously fall off below, but they are picked just in time to avoid loss from this cause. The shrub yields two or three, or sometimes even four, crops in the twelve months. They are picked by hand and immediately dried in the sun

upon smooth floors of hard clay, or preferably of flat stone. As the upper layers dry the lower must be continually stirred up. Not even the slightest amount of rain must be allowed to fall upon them. Hence men stand always ready with huge brush brooms, and upon the slightest indication of rain sweep them through the immense doors of the buidings which surround the drying-floor. A few hours of hot sun is sufficient to dry them, but they must be kept in the houses for two or three days to undergo a slight sweating process. When this supplementary moisture has dried, they are pressed very tightly into small bales, called *cestos*, and are ready for marketing. The tight pressure is as much to exclude the moist atmosphere as to secure convenience. For transportation across the mountains and export they are encased in oil cloth or rawhide. Upon being opened the few outer layers may be found discolored, but if properly dried and packed it is rare that the remainder undergoes any conspicuous change. Yet a slow deterioration commences at once after drying. No matter how carefully they are kept, the chewers prefer them in proportion to their freshness. After being kept for a very few months they will scarcely be accepted for native use, and these leaves, which the natives would reject, are the only ones which are ever used by us for medicinal purposes. The chemical nature of this change has never been determined, though the writer has demonstrated that it is due to only a slight extent to the loss of cocaine, which is clearly not the constituent which the native chewers find most efficacious, a fact to be borne in mind in connection

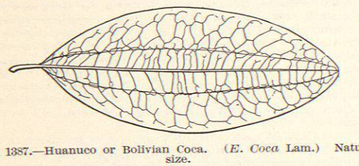

FIG. 1387.—Huanuco or Bolivian Coca. (*E. Coca* Lam.) Natural size.

with their use of alkali, as referred to above. Neither is it true, as has often been suggested, that this native preference is due to differences of savor merely.

Aside from the method of chewing, which is despised by the better classes, large quantities of the leaves are prepared in the form of a sort of fluid extract or cordial for use as a liquor or *pousse café*.

Coca paralysis or coca mania, which has frequently been discussed in a somewhat sensational way in the medical press, and which has been compared with cocainism, is so rare, at least among the Bolivians, as to be almost a fiction. The writer was never able to find a case or any authenticated account of one. Nevertheless it is not unlikely that such do occur.

DESCRIPTION OF DRUG.—The leaves occur in a yellowish-brown to brown mass, a distinct green color being rare, and even a distinct green tinge to the brown being oftener wanting than present. Much of the quality is to be determined by the color characteristics. A very young, and therefore inferior leaf, is more apt to retain the green color. A badly cured or preserved or very stale leaf will be of a dark brown. If only stale, this brown will be uniform and dull; if badly cured, it will be smudgy and patchy and of a stained appearance. The perfect leaf will be of a rich, light, clear brown, with more or less of golden or greenish tinge, never bright green, and with a slight lustre. They are mostly flat and unbroken in the best preserved samples. They have a very short, stout petiole. The blade is from 2.5 to 7.5 cm. (1 to 3 in.) in length, and a very little more or less than half as broad. It is oval in outline, a very slight point at the apex and a very short abruptly narrowed basal portion, the length of which is not more than one-twelfth of the entire blade. Except for this portion and the slight tip, the outline is an almost perfect ellipse. The margin is quite entire, the surface smooth, the body thickish, the consistence somewhat tough and slightly leathery. The midrib is very prominent below, traversed by a narrow ridge above. The venation markings are rather obscure on both surfaces, especially above. Upon the lower surfaces two characteristic lines are prominent, known as the "lateral lines." They run at a little more than one-third of the distance from the midrib to the margin, and terminate at both ends, not in the midrib, but in the margin, at a slight distance from it. They are not veins, but consist chiefly of collenchyma cells, and are to strengthen the edges of the folds, in the bud. The surface enclosed by them is of a lighter shade than that outside, and is known as the "areola." The more highly cultivated and finer and richer the leaf, the more conspicuous are these lines. As the plant escapes and retrogrades in the wild state, these lines appear less conspicuously in the dried leaf, which becomes thicker, browner, more veiny and rougher of surface. The foregoing is a description of the typical leaf, as grown in the Andes and some other parts; it varies with the narrowed basal portion longer, but always much less than half the length of the leaf, and the leaf never narrower than obovate. It also varies to paler, but is never of a pale sennagreen color, like the next variety. The apex is often very slightly retuse, and the midrib produced into a slight apiculation or mucronation. The faint odor has been denominated "tea-like," but it is characteristic of coca. The taste is slightly bitter and barely aromatic. The bitter taste is greater in poorly cultivated and in wild or shade-grown leaves. A little while after chewing anæsthesia of the tongue and lips occurs. Experience can enable one to estimate almost exactly the percentage of cocaine by the degree of this effect.

Some other leaves are occasionally chewed by the natives when coca is not obtainable, purely as a masticatory. One of these is apparently a Mimosea, and is called "Chiuchi-coca." None of these is observed in our drug, which is not likely to be adulterated nor substituted by anything except another variety of coca.

COMPOSITION.—The alkaloid *cocaine* is, in professional medicine, the important constituent, and exists to the extent of one-half to nine-tenths of one per cent. This alkaloid is considered in a separate article. Since it is a *methyl-benzoic acid* compound of the alkaloid *ecgonine*, it is not surprising that the latter alkaloid should be encountered in the drug, both free and in combination with various other substances. Neither the constancy nor the percentage of these, nor the resulting modification of the drug's action, has been investigated or much considered. With these alkaloids, there is a little tannin and wax and a very slight amount of an aromatic principle.

ACTION.—So far as medicinal practice and literature are concerned, the action of cocaine is that of coca, and will be considered under the title of *Cocaine*.

That the two are the same in action is assuredly not true, but the differences between them and the action of the other alkaloids are subjects which have not been suitably investigated, the assumption generally prevailing that they are practically the same. No differences can be expected between cocaine and coca as it reaches us, with cocaine as the chief constituent, which can be compared with those between the alkaloid and the leaves immediately after being collected and dried, for careful drying effects scarcely any change in their composition or activity. In spite of this fact it is unfortunate that the action of our leaf preparations should not have received more study. The only official preparation is the fluid extract, of which the dose is 2 to 4 c.c. (fl. ʒ ss. to i.). A properly made wine of coca should contain about fifteen per cent. of the drug, the dose being 8 to 16 c.c. (fl. ʒ ij. to iv.).

Other Varieties and Species.—The genus *Erythroxylon* is one of two in the family *Erythroxylaceæ*, and it contains about one hundred and forty species, for which more than one hundred and seventy names have been proposed. About one-sixth of the species are foreign,

the others natives of tropical American countries. Cocaine, or at least some principle having slight locally anæsthetic properties, pertains to several species, but in only three, or only one with its two varieties, if that view be taken, are they of practical importance. Of these the principal one has been considered above. That next in importance is *E. Truxillense* Rusby (*Druggists' Circular*, 1900, p. 223), or the Truxillo, or "Small Green" leaf. It was called *E. Coca Spruceanum* by Burck, but is a distinct species, and there is already an *E. Spruceanum* Peyr. This is the leaf chiefly cultivated in Northern Peru, Ecuador, Colombia, Mexico, and Brazil. It is not the one commonly spoken of in English journals as the Truxillo leaf. According to Burck, it is also the leaf cultivated in Java and is sometimes written of as the "Java" leaf. Its most distinctive characters are its uniformly small size, pale, senna-green color, thin and brittle texture, and tapering base. It varies between obovate and oblanceolate, the lower half tapering gradually, and is about two-thirds the size of the Huanuco variety. The apex may contract abruptly into a short point, or be slightly emarginate, then apiculate. It is exceedingly thin and brittle, and occurs much broken. Its color and general appearance at a distance are those of India senna. Most of the leaves, in the dry state, are wanting in the lateral lines, and when these are present they are quite indistinct. The mode of cultivation and packing of this variety are about the same as of the other, but it does not bring so high a price. The published statements as to its composition are very contradictory. Its yield of total alkaloid has been placed as high as 2.25 per cent., but this estimate is doubtless erroneous. A more trustworthy assay makes it about one per cent., or a little higher than that of the last. This alkaloid, however, differs greatly in kind from that of the official leaf. Instead of cocaine it consists, to a very considerable extent, of cinnamyl compounds of ecgonine. It yields a much larger percentage of truxilline (isatropylcocaine) than either of the others, with benzoyl-pseudotropeine. Of these, the former is believed to be poisonous, while the latter is less poisonous and acts very much like cocaine. Certainly, manufacturers find it impossible to produce from it an equal quantity of cocaine. This, however, affects the manufacturer alone, for it by no means follows that it is inferior for medicinal use. In fact, the use of the fluid extract prepared from this variety has been found by many physicians to produce better results than the use of that from the other variety. This, it may be remarked, is quite in keeping with several other indications already mentioned, that much of the physiological action of coca is not referable to its cocaine. It appears to be the benzoyl-ecgonine which produces the stimulant effects, while lacking the anæsthetic properties. It would seem to the writer that the idea of substituting this variety for that

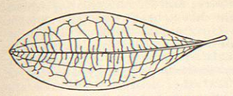

FIG. 1388.—Truxillo Coca. (*E. Truxillense* Rusby.) Natural size.

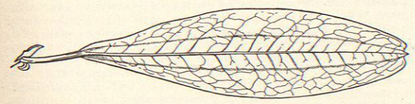

FIG. 1389.—*E. Carthagenense* Jacq. (?)

now official, and of allowing the latter to be represented by cocaine only, is worthy of the most careful consideration.

There is a third variety of the coca leaf, known in English journals as the Truxillo leaf, but never seen in the New York market, where the Truxillo leaf is an important article of commerce. It has been called by Morris "E. Coca Nova-granatense," but there is little doubt that it is one of the first described species of Erythroxylon, namely, *E. Carthagenense* Jacq. It appears to be native in Colombia, and largely cultivated in the British provinces, whither all the stock was sent from a single plant cultivated in the Kew Botanical Gardens. The leaves (Fig. 1389) are about two, or even three inches long by one-third as broad, oblanceolate, with a very long tapering base and a rounded, mostly emarginate, then mucronate summit. They are pale and thin, and the lateral lines and areola are very well marked. Their composition is very similar to that of the Truxillo leaves, though it is said that the isotropyl-cocaine is wanting, or present in slight amount. There appears so far to be no good reason why they should not rank with the Truxillo leaves as a medicinal agent, though much fuller information concerning them is required.

Henry H. Rusby.

COCAINE.—(*Methyl-benzoyl-ecgonine*) $C_9H_7(CH_3)N.CH(O.CO.C_6H_5)(CH_2.CO.OCH_3)$.* Cocaine itself is not official in the United States, but its hydrochloride is, as "the hydrochlorate of an alkaloid obtained from coca." Quite a number of other salts of it are in the market, but this is the one most used. As it is therapeutically the equivalent of the alkaloid, except as to its solubility and slightly lower strength, we may discuss its properties as those of the alkaloid itself. The origin of cocaine is sufficiently explained in the preceding article on *Coca*. It was first isolated by Gardeka in 1855 and by him named *Erythroxyline*. Niemann, who renamed it cocaine, gave much fuller information concerning it. It was many years after its discovery before its physiological action was thoroughly investigated, although its benumbing power and its action in dilating the pupil were early made known. About the year 1880 many important reports concerning it began to appear, and its remarkable uses in ophthalmology began, in 1884, to be developed. The first productions were extremely expensive, selling as high as $3 per grain, with a steady reduction to a little more than one cent per grain five years later. Those very high prices were due merely to rarity of manufacture. The subsequent lower, but still very high prices were due to the presence in Europe and America of only accidental lots of leaves at a time when a heavy demand arose. After the demand for the leaves began to be fully met, prices which would now be considered very high were still maintained, in consequence of manufacturing expenses which have since been greatly reduced. Coincident with these high expenses of manufacturing, the processes of purification were imperfect, and led to many serious accidents in the application of the drug to the eye, and to misinterpretations of its normal action. At the present time, manufacturing processes may be considered to have been about perfected, as to both quality and economics, and the action of the drug is as well known as that of almost any other.

In spite of the very extensive use of eucaine and orthoform, which act similarly, and in some respects preferably, to cocaine, the consumption of the latter is enormous, reaching in the United States probably not far from 150,000 ounces annually and is steadily increasing. Various natural products, such as *erythrophleine*, have been proposed as substitutes, but their action is far from being as satisfactory. Originally, all cocaine was extracted from the leaves in this country and in Europe, but since then economies in transportation and the avoidance of damage to the leaves in transit have led to its extraction in an impure state at the points of production in Peru and Bolivia, and its subsequent purification in Europe, our tariff prohibiting its profitable importation into this country for that purpose. The following method of manufacture was supplied by Dr. Squibb for the last edition of this work:

The ground coca leaves are moistened with a solution

* The writer of this article desires to acknowledge his indebtedness to Prof. Henry H. Rusby, of this city, for valuable assistance rendered in the revision of the text.