

A visit to the native cinchona forests of South America / by Henry S. Wellcome.

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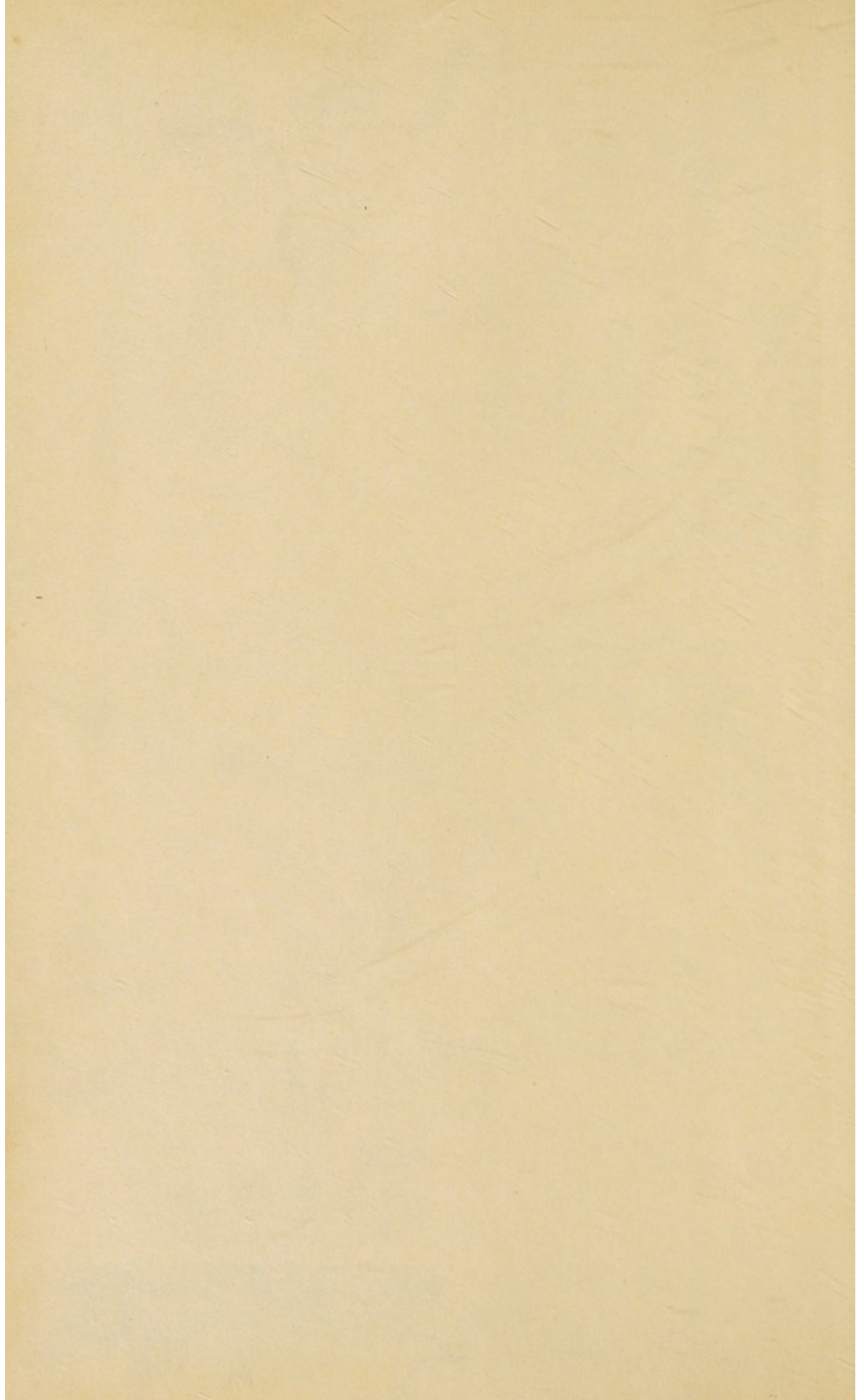
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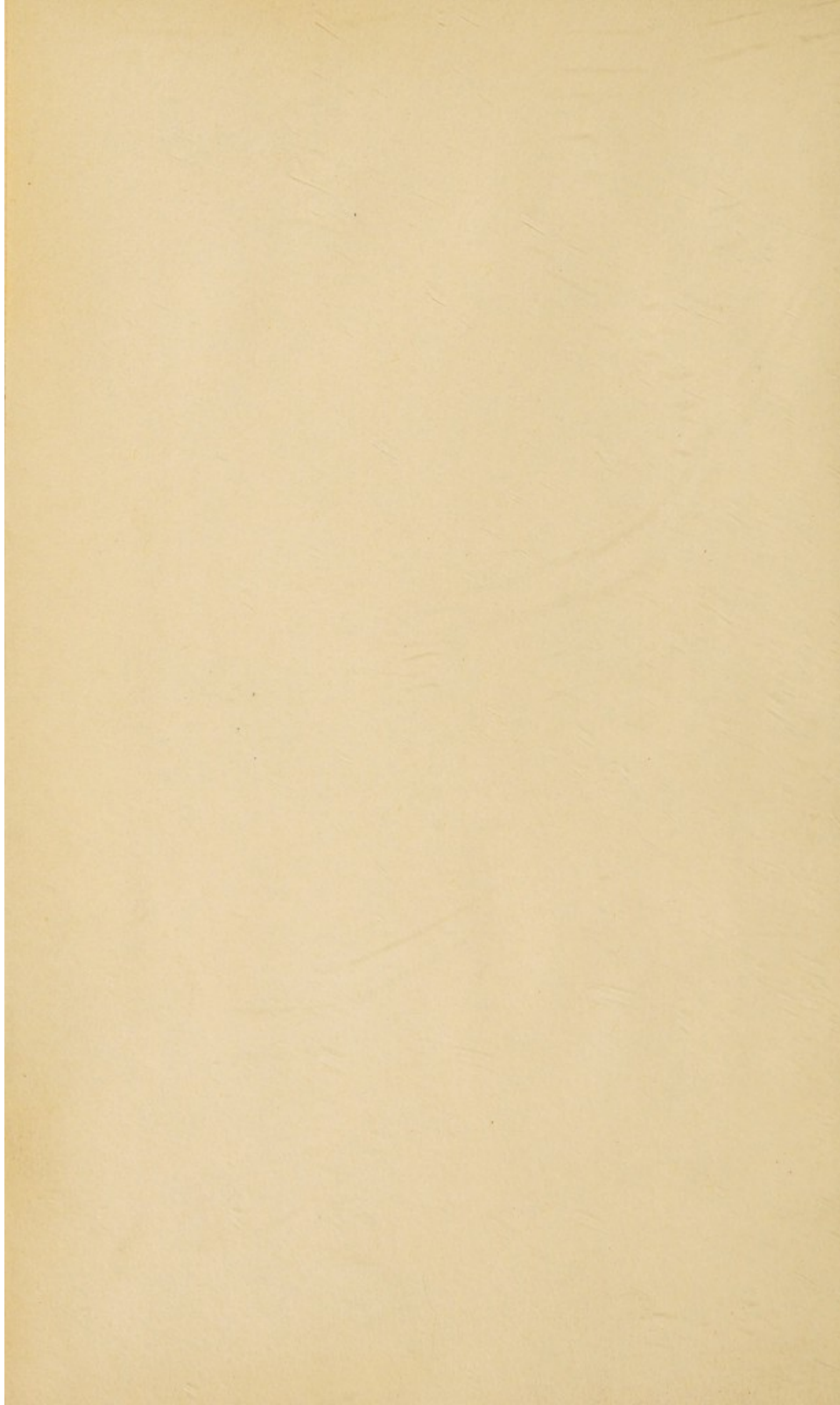
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PROCEEDINGS

OF THE

AMERICAN PHARMACEUTICAL ASSOCIATION

AT THE

Twenty-seventh Annual Meeting,

HELD IN INDIANAPOLIS, IND., SEPTEMBER, 1879,

ALSO THE

CONSTITUTION, BY-LAWS, AND ROLL OF MEMBERS.



PHILADELPHIA:
SHERMAN & CO., PRINTERS.
1880.

Samuel S. Purpelle, M.D.

WELLCOME
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/171

APPENDIX.*

A VISIT TO THE NATIVE CINCHONA FORESTS OF SOUTH AMERICA.

BY HENRY S. WELLCOME.

DURING the past year, while in South America, I visited some of the principal cinchona districts, and the following notes are based upon my personal observations, and information obtained from native bark dealers and gatherers.

The cinchona forests of Ecuador—of which I shall speak in particular—were, for many years, the only source from whence the world was supplied with barks; they still yield large quantities, and are being actively worked.

The bark-producing territory of Ecuador is divided into two general districts, known as Bosque de (forest of) Guaranda and Bosque de Loja.

The vast tract of wilderness extending from the boundary line of New Granada, about 1° north latitude, south to 2° south latitude, covers with its rich verdant mantle the western slope of the gigantic Chimborazo, and the outlying ranges of the Cordilleras, from the waters of the Pacific up to an altitude of over ten thousand feet, encompassing within its higher limits the picturesque city of Guaranda.† This district is now the source of the

* The cause of the delay in receiving the following paper has been explained on page 798.—SECRETARY.

† The first cinchona trees discovered within the Guaranda district were found near this city, hence the name of the forest.

larger portions of barks exported from Guayaquil;* many miles of its entangled forests have never yet been explored.†

The older cinchona district, known as Bosque de Loja, was the source of the first barks taken to Europe, or of which we have any authentic history. This district extends from 2° south latitude south to the boundary line of Peru, about 5° south latitude, and, like the Bosque de Guaranda covers the western slope of the Cordilleras below the timber line. The cinchona bark, with which the Countess of Chinchon,‡ wife of the Viceroy of Peru, was cured of fever, in about the year 1640, was collected near the town of Loja. Howard considers it well established that this bark was none other than the Royal Crown Loja quill.§ It is of interest, too, that the cure of the princess was probably due less to the alkaloid quinia than to the lower alkaloid cinchonidia, which predominates in that bark.|| The Loja forests still continue to furnish barks to the Guayaquil market; but there has been a gradual falling off in quantity during the past few years, which is not surprising considering that they have been worked constantly for over two hundred years, and been more thoroughly explored than any other forests of South America.

To reach the southern portion of the Bosque de Guaranda a small steam launch plies between the city of Guayaquil and Pueblo Nuevo, a small town about seventy-five miles distant, or one of

* Guayaquil, the main shipping port of Ecuador, is a city of 30,000 inhabitants, situated on the Guayaquil River, sixty miles from its mouth. The river is navigable to this point by large ocean steamers.

† The limits of these districts are not clearly defined, and can be stated as approximations only.

The northern portion of the Guaranda forest is also known as "Bosque de Esmeraldas," from the name of an adjacent seaport on the coast of Ecuador, from whence some barks from that portion of the district are exported.

‡ It is not known whether Linnæus corrupted purposely or by error, when he gave the name "cinchona" to the new genus (which he established for it) to commemorate the name of the Countess of Chinchon, through whose beneficent efforts the great remedy first became generally known in Europe.

§ From *Cinchona condamin*; grows to the height of eight to twenty feet, and at an altitude of 6000 to 9000 feet.

|| At that time the Royal Crown Barks were considered the finest quality, but have long since ceased to hold that regard; under the advanced knowledge of quinology analysis shows it to rank low in the yield of the alkaloid quinia. By cultivation, in the East Indies, it has been made to increase its percentage of the valuable alkaloids.

the eastern branches of the Guayaquil River. The trip is an exceedingly interesting one; hundreds of Indian canoes and balsa rafts* are met, laden with fish, vegetables, and fruit, for the Guayaquil market.

We passed innumerable little floating islands, covered with exuberant growths of aquatic plants. Loathsome alligators crawl up the river-banks and bask in the warm sun; great numbers of white herons flock along the shore. Here and there little hamlets of bamboo nestle in shady nooks, surrounded by groves of oranges, mangoes, and bananas.

Occasionally we are startled by the thundering boom of the ever-active volcano Saugay.† To the north, towering far above the clouds, we saw the lofty summit of Chimborazo, "grand monarch of the Andes," in all its resplendent glory; a dazzling pinnacle of everlasting snow, emblematical of a spotless purity, that presents a mocking contrast with the people who dwell upon its slopes, and call it their father. According to a legend cherished by the Chimbo Indians,‡ "many years ago their nation was founded by the great Chimbo razo (chimbo father); they prospered under his wise guidance, and became a powerful people, but finally the great father died and changed to the mountain of snow (Chimborazo), that he might furnish his children with water to drink. But, on the very day that the mighty Inca nation§ conquered them, Chimborazo was so stricken with grief that his head fell off." An irregular spur, jutting out from the north side of the mountain just above the snow-line, is pointed out as being his head.

Arriving at Pueblo Nuevo peons|| and beasts are engaged and equipped for the journey, on muleback, or, as sometimes face-

* Balsa rafts are made by lashing together with bejucos the trunks of a tree called balsa palma; they are as light as cork, and exceedingly buoyant. Rigged with masts and sails these craft cruise along the coast, and sometimes venture well out to sea.

† The volcano Saugay was active at the time of the Spanish conquest, and has been in constant eruption ever since. It discharges every thirty or forty minutes; the explosions are often heard in Guayaquil, over one hundred miles distant, and her ashes fall in the streets.

‡ The descendants of the Chimbos now live in the Valley of Chimbo, on the western slope of Mount Chimborazo.

§ The ancient Peruvians found in possession of the country at the time of the conquest by Pizarro.

|| Peon, an Indian servant, laborer, or slave.

tiously termed, "on the hurricane deck of a mule." All travel and transportation must be done on the backs of beasts or Indians, as wheeled vehicles are useless for want of roads. In the higher altitudes, llamas serve as beasts of burden, and in the valleys of Quito and Riobamba I have seen sheep, goats, and cattle used for the same purpose.

From Pueblo Nuevo extends a few miles of the narrow gauge railroad* constructed under the administration of the late President Garcia Moreno. It was his greatest ambition to open to the outside world the glories of the higher Andes. But shortly after the road was begun an assassin's knife checked his energetic and enterprising career.

The trail through the forest is simply a rough bridle-path, worn by years of travel, though not improved by use, sometimes leading us through low marshy places of nearly bottomless mire, where the beasts floundered about, sinking deeper and deeper, until they and ourselves were nearly submerged. Proceeding to the interior the forest growths show greater exuberance; the trees are so netted with vines, creepers, and trailing lianas, and the foliage so closely woven together, as to present almost impenetrable walls on either side of the way, draped with rich verdure, while leaves of bright and varying tints light up and relieve the sombre shades.

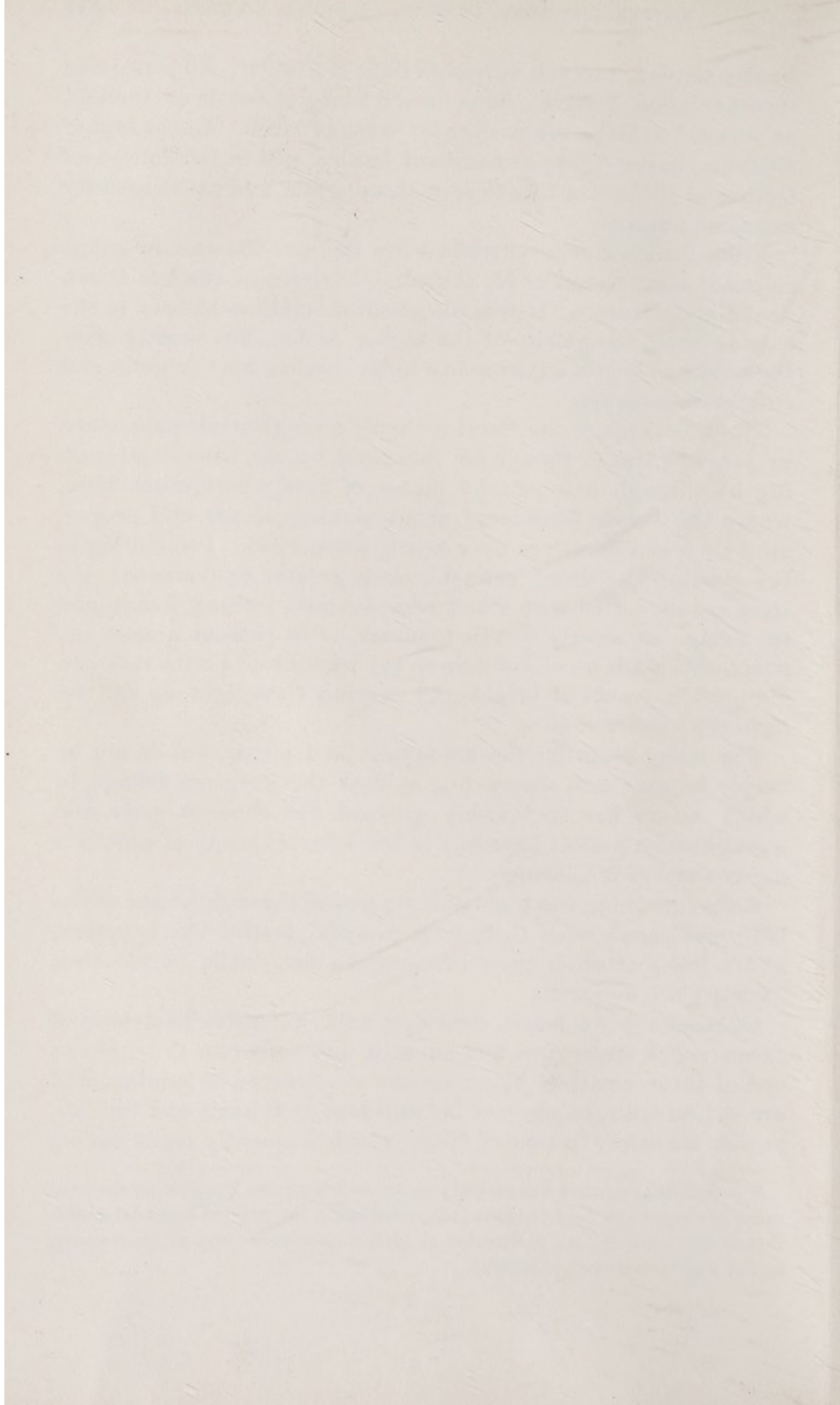
The many beautiful flowers attract and please, but do not so deeply impress and charm one as does the gorgeous foliage, in which nature has so lavishly grouped the choicest gems and wrought such perfect harmony in her infinite variety of elaborate designs and rich colorings.

Before reaching the highlands we passed through forests of the ivory-nut palms, with their long, graceful, feather-like branches, and a few scattering trees of *cinchona magnifolia* (a valueless variety), are met with.

Occasionally we found clearings, with extensive haciendas of cacao, coffee, sugar-cane and annatto, and halted for the night at one of these estates. The huts are constructed of bamboo, and erected on stilts, to prevent the entrance of animals and reptiles, as also for safety in time of floods, which frequently occur during

* A German engineer has recently contracted with the Ecuadorian Government to extend the road to Quito, but considering the present financial condition of the country, the realization of such a stupendous feat of engineering in our day is extremely doubtful.

15. 4. 25 ft
low flood line
inhibitions



the wet season.* The house-furnishing is very simple; neither chairs, tables, beds, or stoves are found in these huts; fire is used for cooking only, and is prepared on a flat rock, or on the ground. The fare is quite as meagre; our bill consisted of calde, loco, and roasted plantain. Calde is their most substantial dish; it is prepared by boiling together—in something like the style of an Irish stew—the tough rank meat of a gaunt black pig of the country, with potatoes,† onions, garlic, and Chili peppers. Loco is a peculiar mushy soup, made by boiling potatoes and eggs together with various condiments. Plantains are roasted by burying them in hot coals and ashes before removing the peel.

Food is served in a rough carved bowl of wood, or calabash; the liquid portion taken with a wooden spoon, and the solids fished out with the fingers.

The natives in these forests do not burden themselves with extensive wardrobes. The young, under fifteen years of age, often appear in the innocence of perfect nakedness.

There is something peculiarly fascinating about the careless simplicity of these people, their procrastinating manner of life, and romantic surroundings.

In the place of beds we found repose upon the floor; but the nights at the equator are too delightful for sleep; the skies are so clear and transparent that one can seem to peer into the remotest depths of space, and, verily, to view the realms of Deity. Nothing can surpass the enchanting splendors of the tropical skies; the stars shine out in the great azure dome with a brilliancy unknown in our northern climes, while myriads of more distant luminaries cluster like clouds in the background.

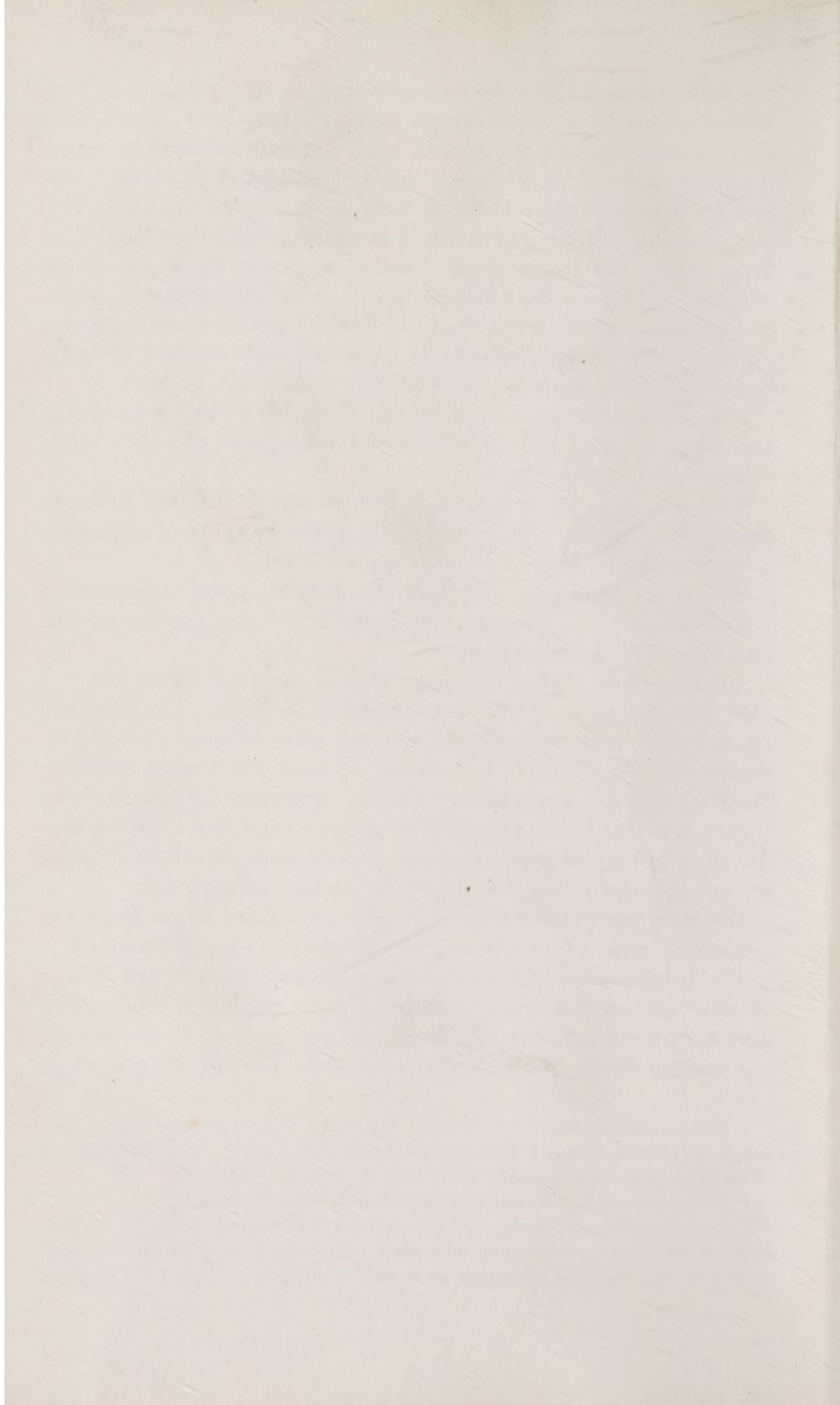
We miss the Dipper of the constellation of the Great Bear, but are amply repaid by a view of the Southern Cross in its stead.

The bright moon and starlight penetrating the mingled foliage of the lofty forest trees produce mystic shadows, delineating divers grotesque, unearthly forms, and adding to the weirdness of our surroundings; the lightning-beetle‡ flashes out a vivid gleam

* The wet season, called "invierno," lasts from December until May; during those months frequent heavy rains occur, and, together with the melting of snow on the high mountain-peaks, produce furious floods.

† Potatoes were first introduced into Europe from Ecuador.

‡ *Pynophorus noctilucis*. In the evening these beetles are worn as jewelry by the native women, and with very charming effect. The insect is attached to the clothing by means of a sort of harness of thread. The light



of greenish-yellow light, that, to the brilliancy of a diamond, is like contrasting the electric light to a tallow dip.

Balmy, zephyr-like breezes gently fanned us into such a dreamy fanciful mood that we could easily have imagined ourselves transported to a fairy-land, were it not for the ravenous onslaughts of cannibalistic fleas and mosquitos, forcibly reminding us that we were yet beings of flesh and blood.

At midnight the temperature fell to about 50° F., and a damp clammy chill came over us, making us wrap more closely in our blankets.

After continuing our journey for some distance into the foothills, we left the regular trail and struck into a newly cleared way to the north, keeping our peons ahead, with machetes* in hand, to cut away the bejucos† which hang in loops that threaten to catch beneath the chin and jerk one from his beast. Very strong clothing is required in travelling through these forests, for the many hooked branches play havoc with one's habit, and often cut ugly flesh-wounds.

In crossing the rivers a tree felled across, from bank to bank, served as a foot-bridge, over which we passed, while our mules were made to swim; it is not without considerable danger that these crossings are made, and frequently serious accidents occur.

In some of the more travelled Andean trails, where the banks are very high and abrupt, the rivers are crossed by hammock or swinging bridges, made of bejucos. The small mountain-streams are usually forded; frequently we follow up their banks, recrossing sometimes half a dozen times within a mile.

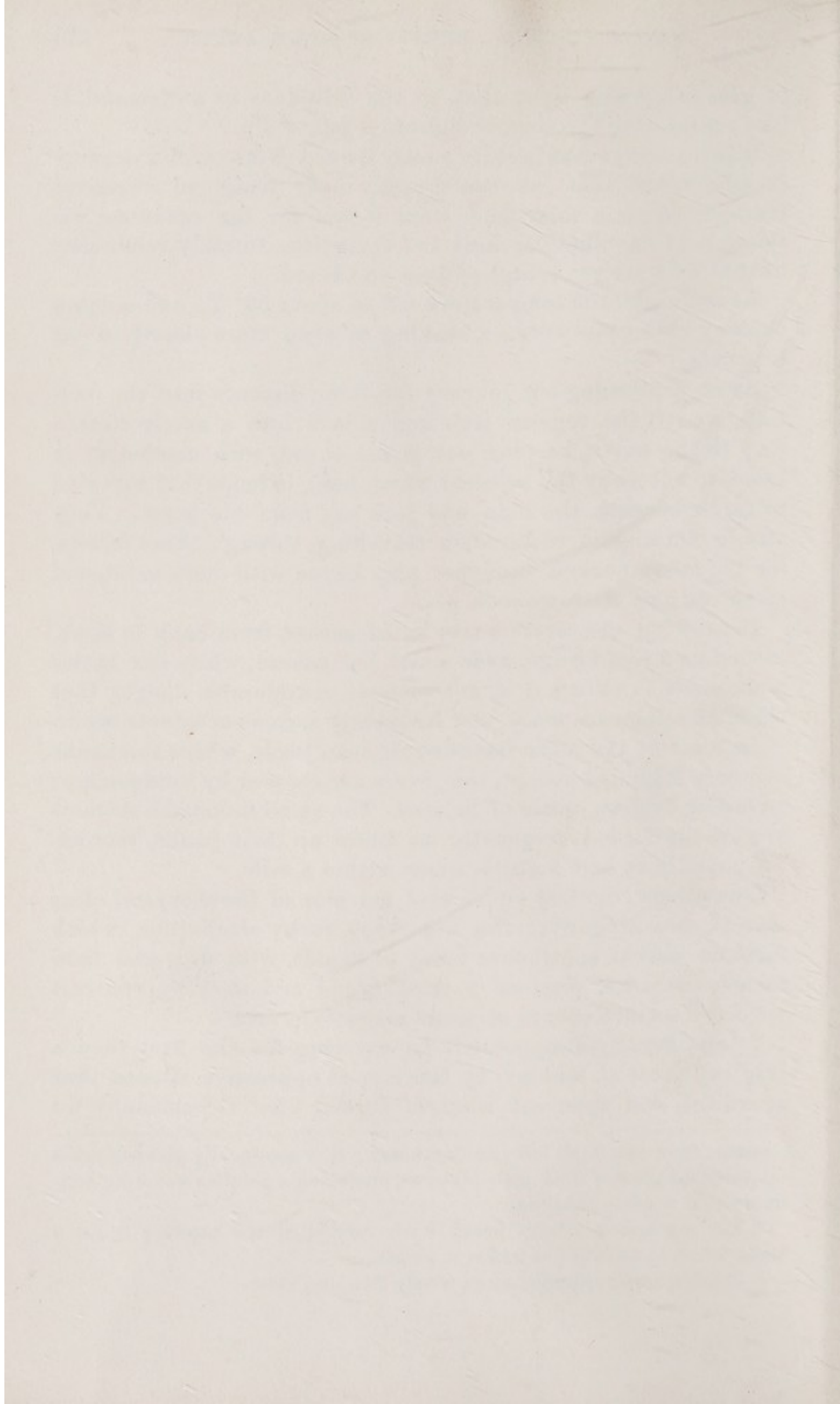
The cheery, musical ripple and murmur of those crystal clear waters, breaking over the numerous rocky declivities, which form an almost continuous array of rapids, with now and then furious cascades, produce a most grand and striking contrast with the sombre silence of those majestic forests.

I was greatly disappointed on entering for the first time a tropical forest at midday, by the almost oppressive silence that prevailed, and apparent want of animal life. Occasionally we

proceeds from two small lobes on the thorax; they continually dim and again intensify the glow of these little lanterns, producing a peculiar wavering brilliancy that is quite dazzling.

* The machete is a large heavy knife carried by the natives; it has a blade fifteen to twenty-five inches in length.

† Bejucos, a name applied to all woody climbing vines.



heard the zip of a humming-bird, and traced, like a flash, the glitter of its brilliant plumage in the sunlight as, for a moment, it darted from one flower to another, then, fairylike, disappearing in an instant.

Great numbers of beautiful butterflies floated silently past, waving their banner-like wings, so resplendent with lustrous hues.

Now and then a reptile glided across our pathway, and a gang of monkeys, taking fright at our approach, would scramble away into the tops of the higher trees.

Little else of animal life was seen during the day, but at twilight and in early morning the whole forest seemed to be alive; above all, in the hubbub of unearthly noises, could be distinguished the shrill screeches of the macaws, toucans, and parrots, and the yelling or howling of monkeys.

Little music could be found in all these discordant sounds. It is remarkable that among the many tropical birds of gay plumage there are very few sweet songsters; their notes are nearly always harsh and shrill.

Getting fairly into the mountains the difficulties and dangers increase; zigzagging up almost vertical cliffs, only to find steep descents, and descending to climb again. In these mountains it is necessary to trust entirely to the mules.* Often having to go through narrow passageways, between huge boulders, dodging projecting rocks, then winding our way around the mountain-sides in narrow grooves, barely wide enough for the beasts to gain a footing, sometimes along the verge of frightful precipices of several hundred to a thousand or more feet. In some of the older trails there can be seen in the far depths of the chasms below whitened skeletons of human beings and mules, and now and then ghastly human skulls are found placed in niches cut into the bank along the passage, invariably with a cross above them, being tenderly suggestive of lurking dangers. Words are inadequate to picture the terribly broken and precipitous character of these Andean ranges; on every side traces of eruptive violence are distinctly visible; every rock shows the marks of a tremendous crushing force; the irregular masses of rock and earth heaped together form tortuous ridges and bold craggy spurs, with numerous intersecting fissures, ravines, and vast chasms; every

* The sagacity of a mule is truly wonderful. They are the only safe animals for travelling in these mountains. They are far preferable to donkeys.

physical feature is modelled on a scale of magnificence and grandeur. Towering proudly above the Guaranda and Loja cinchona districts, and grouped within a radius of one hundred miles, are the lofty trachyte and porphyritic peaks of more than twenty volcanoes,* four of which are now active. Ecuador is a very hot-bed of eruptive elements; she is frequently convulsed by earthquakes, and at irregular intervals her volcanoes break forth with terrific fury, belching their fires high into the heavens, ejecting volumes of molten lava, and devastating the surrounding country with showers of stones, ashes, and mud.

It must have caused our planet to quake to its very centre when nature's mighty convulsive forces burst their subterranean bonds, upheaving, rending, and fragmenting the earth's surface, forming midst that awful chaotic tumult these vast Cordilleras, with summits so near to heaven that they will never be defiled by the footprints of mankind.

In many places, while penetrating the forests, we were obliged to dismount and climb, while our mules were lifted almost bodily up the jagged steeps by the peons; but finally we reached a point beyond which it was impossible to take the animals. Leaving them in charge of a peon, we proceeded on foot, picking our way through the blind mazes of dense jungle, clambering over the decaying trunks of fallen trees, continually ascending and descending steep places until we gained a point on one of the great spurs, where we saw spread out before us a boundless undulating sea of wilderness, as far as the eye could reach, a gorgeous expanse of matted verdure, illumined by showy blossoms of glowing colors; here and there tall slender columns of the palms pierced the forest roof, and gracefully waved aloft their drooping feathery branches.

The surpassing grandeur of this view was enrapturing beyond expression. On every hand the manifold and varied beauties unfolded themselves with almost bewildering rapidity; but suddenly a huge bank of clouds drifted upon us like a Newfoundland fog, curtaining the scene for a few moments, and then quickly passing off.

Our cascarillero† soon descried some cinchonas in the distance, by the glistening leaves, which reflected brightly the vertical rays of the sun.

* Many of these volcanoes are continually mantled with snow.

† The bark-collectors are called cascarilleros.

This characteristic reflex of the foliage, together with the bright roseate tints of the flowers, afford the means of discovering the cinchonas among this mass of forest giants. In prospecting by the appearance of the leaves alone a novice is easily misled by the india-rubber tree, which has a glossy leaf very like the magnolias of our Southern States, and when seen at a distance reflecting the bright sunlight is easily mistaken for the cinchona.

Our cascarillero led us down a steep, slippery bank, formed of a reddish-yellow micaceous clay, which yielded like grease beneath our feet; we were obliged to cling to vines and limbs for support, as every few steps rocks would detach, and fly crashing through the thickets below.

Finally reaching the bottom of the ravine we followed the sinuous course of a small stream until suddenly our guide shouted "Cascarilla!*" and we were gladdened by the sight of several fair-sized trees of *Cinchona succirubra* on a slope near by.

The older cinchona tree, as found in their virgin forests, are really very grand and handsome.

The cinchonas appear to seek the most secluded and inaccessible depths of the forests for their habitation. They are rarely grouped in large numbers, or close together, but are distributed in more or less irregular, scattering patches; sometimes single trees are found, widely separated from any others of its family; variety and diversity are notable features of tropical forests.†

The *Cinchona succirubra* ranges from forty to eighty feet in height, trunk straight, and branches regular; leaves opposite, evergreen, broadly oval, six to ten inches in length, of a rich dark-green color, sometimes tinged with crimson,‡ the upper surface of an almost waxy lustre, pubescent beneath, finely veined, midrib decided and strong.

The flowers§ have a five toothed, superior calyx, and tubular corolla, are arranged in terminal panicles of bright-rose tint, and diffuse a pleasing fragrance.

* Cascarilla is the Spanish word for bark.

† Agassiz once in Brazil counted over one hundred different varieties of trees within an area of half a mile.

‡ The leaves of *Cinchona succirubra* show more red than any other variety. It is due to the larger amount of cinchotannic acid present.

§ At the time of my visit (month of June) none of the cinchonas were yet in blossom.

The capsules are ovoid, and contain thirty to forty flattened seeds, winged all around by a broad membrane, irregularly toothed, and lacerated at the margin.

The bark of the large trees is usually completely covered and fringed with mosses of the most delicate lacelike texture, interspersed with lustrous variegated lichens, and prettily marked diminutive trailing ferns.

Air plants and vines in profusion entwine themselves among the branches, and hang in graceful festoons, forming hammocks, in which cluster an abundance of parasitic growths, particularly of the orchid family; these plants cling to every limb and vine, flourishing in their fullest splendor, exhibiting many remarkable phenomena in their curious mimicry of insect and animal forms.* Vegetable growths develop with wonderful luxuriance beneath the almost dismal shades of the closely interlacing branches, which permit but the faintest rays of sunlight to ever filter through their rich leafy drapery; everything saturated and dripping with moisture, the very air we breathed seemed a clammy vapor. In these forests the atmospheric changes are continuous and very abrupt; drifting banks of gloomy clouds are followed by glaring sunshine, and then tempestuous showers, all in rapid succession.

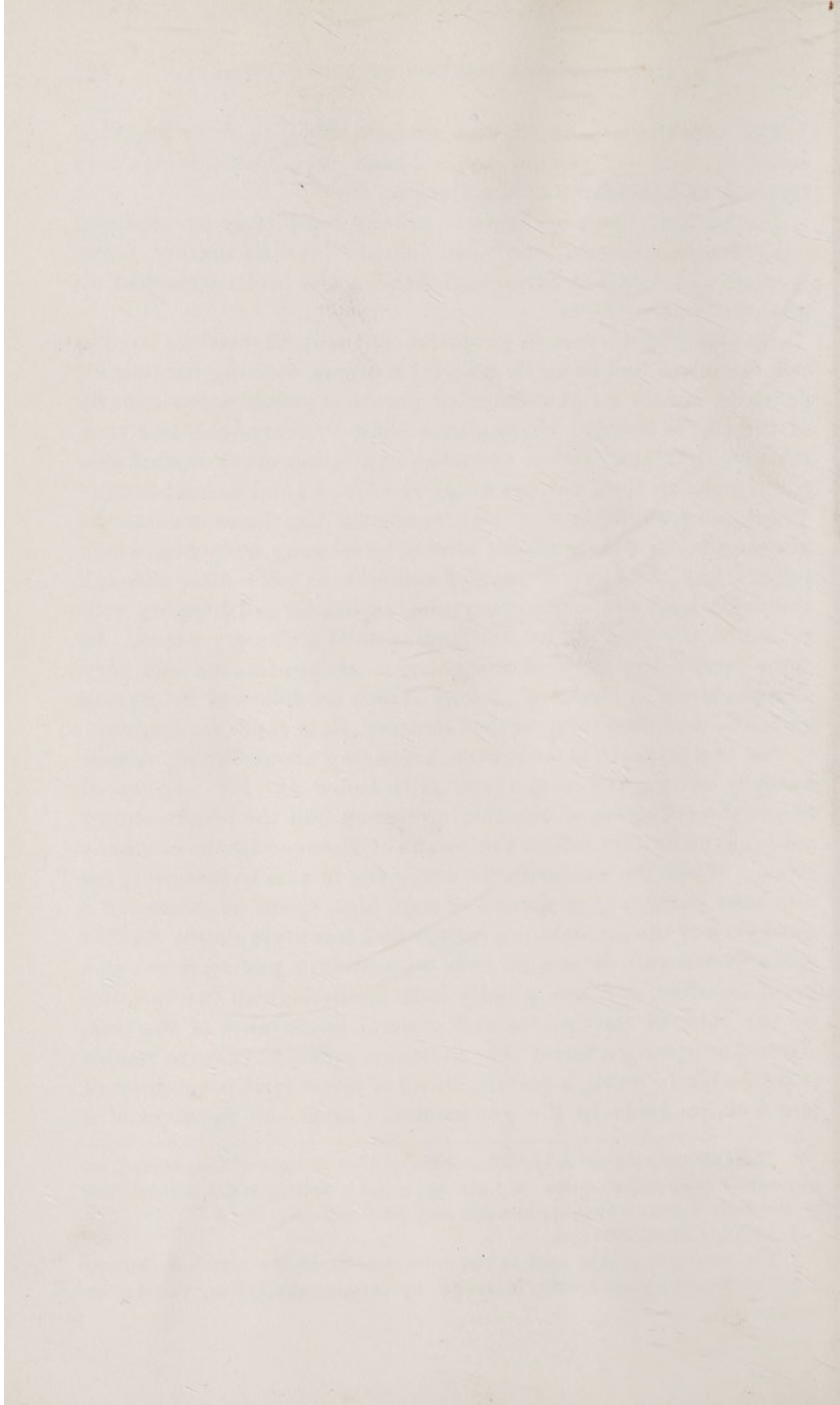
The temperature is more even, averaging about 65° F., seldom exceeds 80° F., and very rarely falls below 45° F.† As stated above the reflection of the shining leaves, and the bright, showy color of the flowers, afford the means of discovering the cinchona trees. When the cascarilleros enter the forests to prospect‡ for cinchona patches they ascend to such high spurs as command a good view of the surrounding valleys and mountain slopes. Skilled cascarilleros can determine very accurately a paying forest at a great distance, and are usually able to distinguish the varieties by the color of the flowers and general appearance of the tree. After discovering a forest that indicates sufficient value to render it profitable to work, a certain limit§ of forest land is condemned and a claim made to the government; upon the payment of a

* The Indians hold some varieties of the orchids in superstitious regard, on account of the peculiar forms they assume, notably among which is the flower of the Holy Spirit, which appears the very prototype of a dove.

† Altitude about 6000 feet.

‡ The term prospect is used in the same sense as in the search for mines.

§ The boundary is usually indicated by certain mountains, valleys, or streams.



certain fee a title* is granted. These claims are christened usually with some sacred name, such as Bosque de San Miguel, or Bosque de Sacramento.† As a rule the bark-gatherers are of that happy-go-lucky sort,—very much like our Western miners,‡—inveterate gamblers, and while they have money dispense it freely, consequently are “dead-broke” every year long before the bark harvest begins.

After discovering a new forest and securing it ^{under} with a government title, the cascarillero applies to a bark-dealer for funds with which to work his claim; if he can present satisfactory evidence that his forest is a profitable one, sufficient money is usually advanced to work it, the title being held by the merchant as security, and with it an agreement that the bark shall be delivered and sold to him exclusively.§ Sometimes the dealers purchase claims outright and employ men to work them.

The season for bark-gathering begins about the 1st of August and lasts until October or November;|| during these months the bark cleaves most readily, and the forests are more easily accessible.¶ A master cascarillero with his gang of peons** enters the forest, and first establishes a main camp, with bamboo huts for habitation and for sheltering the bark. These camps are located near a spring or river and on an elevated point where there is an opening in the forest, so as to allow the bark as much exposure as possible. Sufficient supply of provisions is taken into the forest to last during the season.††

The peons are formed into squads, each division being placed in

* These titles are granted on very much the same plan as those upon mining claims in the United States.

† These claims are each called bosques (forests).

‡ Only they lack the energy of our miners.

§ For many years the bark trade of Bolivia was monopolized by the government; the cascarilleros were obliged to sell their bark to a bank established for that purpose, and receive for it whatever price the officials chose to pay. This system was conducted with such flagrant injustice and dishonesty that it was finally broken up. Now each of the republics levies a duty on all barks exported.

|| In some forests the season begins as early as June.

¶ Because of less rainfall during the summer; it is almost impossible to enter the forests during the wet season.

** Sometimes as many as three or four hundred.

†† In the older forests potatoes and plantains are grown near the main camp.

charge of a jefe,* who is held responsible for his subordinates. These squads scatter through the forest and establish small camps; when they get fairly settled the bark-gathering begins; one or two from each division seek out the trees, while others cut down† and peel them. The trees are first decorticated from the ground up as far as can be reached, and then, after felling and removing the clinging vines and mosses, the rough outer bark is beaten off with a club or mallet. The bark is then cut around the trunk in sections of two to three feet, and longitudinally in strips of six to eight inches in width, then removed with the blade of a machete. The root-bark is obtained by digging away the earth and cleaving with a machete (the pieces are very rough and irregular).

‡ When first taken from the tree the inner surface of cinchona bark shows a handsome cream tint (with juice of the same color), but on exposure to the atmosphere rapidly darkens to a dirty red. The blade of a new sheath-knife with which I cleaved some bark of *Cinchona succirubra*, was stained a beautiful purple color wherever it was touched by the juice.‡

The barks are usually taken to the main camp for drying and storage.

The thick bark of the trunk requires great care in drying because of the excessive dampness of the atmosphere, which sometimes necessitates the use of artificial heat to prevent moulding; it is piled up in tiers with sticks between the layers to allow free circulation of air, and weights are placed on top to flatten it.§ The thin bark from the young trees and small limbs dries more readily and rolls itself up into quills.||

One of the greatest difficulties connected with the gathering of cinchona bark is that of transporting it to the coast at the end of the season. It is roughly sorted, according to the part of the

* Jefe,—pronounced *hefa*,—meaning chief, and sometimes called major-domo. Each squad is allowed to elect its own jefe; the qualifications required for gaining such distinction among their fellows is bravery and superior muscular power.

† The axes used for cutting down the trees are something of the broad-axe pattern, and are of American manufacture. American edged-tools of all kinds receive preference in those countries.

‡ Caused by the action of cinchotannic acid upon the steel.

§ This forms what is known as flat barks,—called by the natives *tubla* (which signifies flat).

|| Called by the natives *canulon*, which means a tube or pipe.

tree from which it is obtained, and packed in bales of about one hundred and fifty pounds each; the Indians carry these bales on their backs a distance of sometimes several hundred miles to a transfer warehouse, from whence it can be transported by mules to the nearest seaport.*

The Indians bear the main weight of the burden upon their heads, by placing over the forehead a strip of rawhide to which are attached cords of the same material lashed to the bale. They stoop forward to maintain their equilibrium, and use long Alpine staffs to steady and aid them in ascending the dangerous cliffs. The skeletons of hundreds of wretched peons now lie bleaching beneath the tropical sun, their earthly toils having been ended by a misstep on the verge of a precipice, or by falling victims to the deadly fevers while bearing upon their backs the very specific intended for the relief of the sick in distant lands.

An old Indian while relating to me the dangers encountered in collecting cinchona bark, said that at the time of the Spanish conquest his people were robbed of their possessions, had since then served as slaves, and are now made human sacrifices to furnish health to the white foreigners.

The malaria in some of the forest valleys is simply fearful, and owing to great exposure and want of nutritious food the Indians yield very quickly to its influence.

I was told by a bark merchant that during a severe malarial season, several years since, as many as twenty-five per cent. of the Indians employed in one district died from fevers before the harvest was completed.

Malarial fevers are regarded with great terror by the Indians, and it is only by extreme poverty, or obligation as peons, that they are induced to enter the bark forests to encounter the dangers for the meagre pittance of ten to twenty-five cents per day.

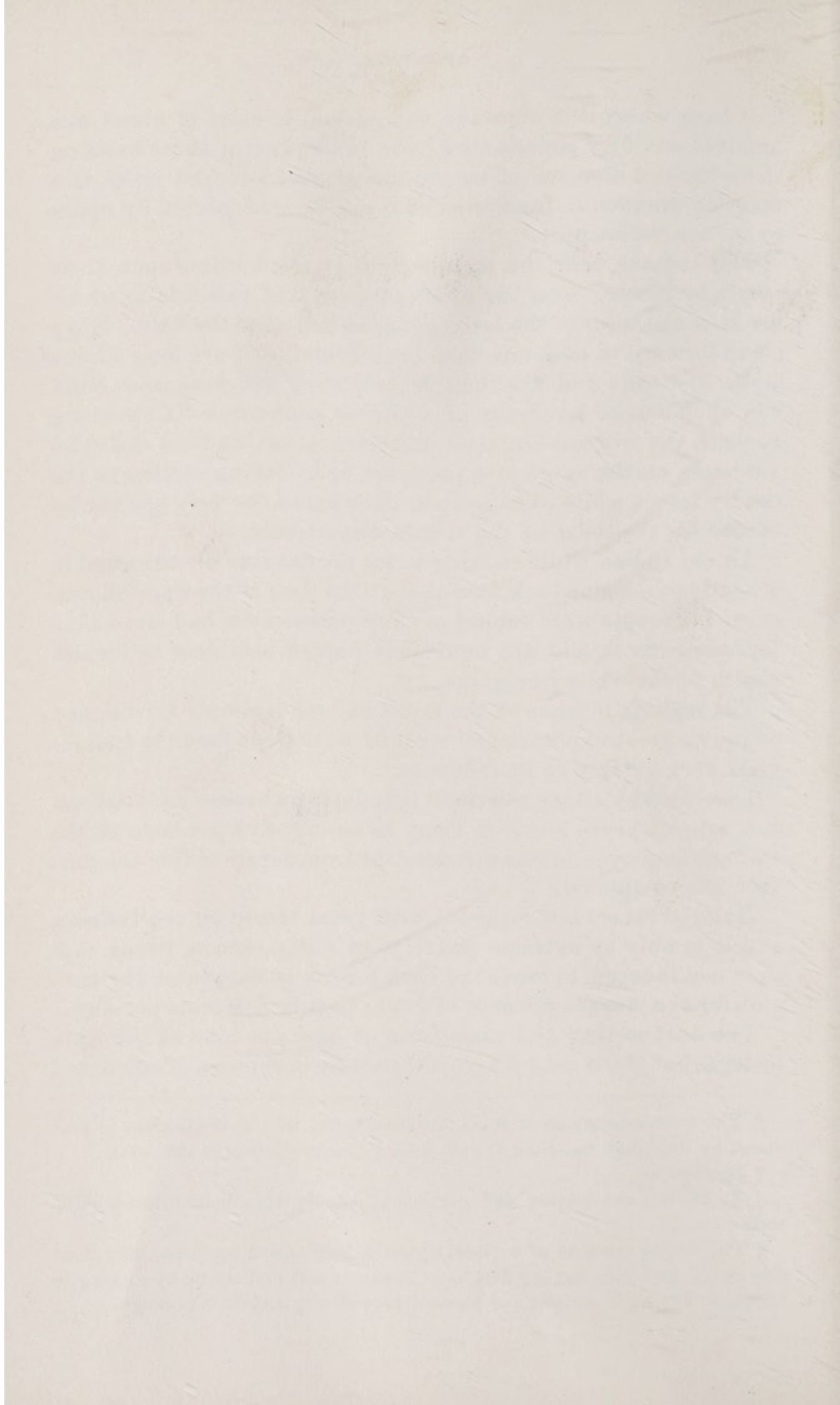
The final sorting and classifying of barks is done at the main bodegas† at the coast,‡ where it is packed in ceroons of cowhide,§

* The worn appearance of most cinchona barks seen in the market is produced by the rough handling it gets during transportation to the coast.

† Storehouse.

‡ In Bolivia the sorting and packing is usually done before transporting to the coast.

§ The ceroon consists of a closely packed bale sewed up in cowhide (hair side out). The hide having first been rendered soft and elastic by soaking in water, on drying it shrinks and forms a very strong and firm package.



or bales of heavy sacking; there it is that most of the adulteration and sophistication is done. The admixture of inferior barks with higher grades is not so much the result of ignorance as has been supposed by many, for the bark dealers are very expert in determining the different varieties and estimating the values of barks; but, strange to say, very few bark merchants ever become wealthy.

All barks enter the market bearing certain brands, such as "J. P.," or "T. B." These brands gain a reputation according to the quality of bark they represent, but it is sometimes the case that as soon as a brand has established a good name the dealer sophisticates with inferior grades.* No large buyers of Europe or America purchase cinchona barks without first making careful assays; but, even with this precaution, they are sometimes deceived, on account of the adroit manner in which the barks are mixed.

The points of shipment for Ecuadorian barks are Guayaquil and Esmeraldes; for the barks of Northern Peru, Payta; from Southern Peru and Bolivia, Arica, Islay, Iquiqui, and Callao. A limited quantity of Bolivian bark is exported by way of the Amazon to Para.

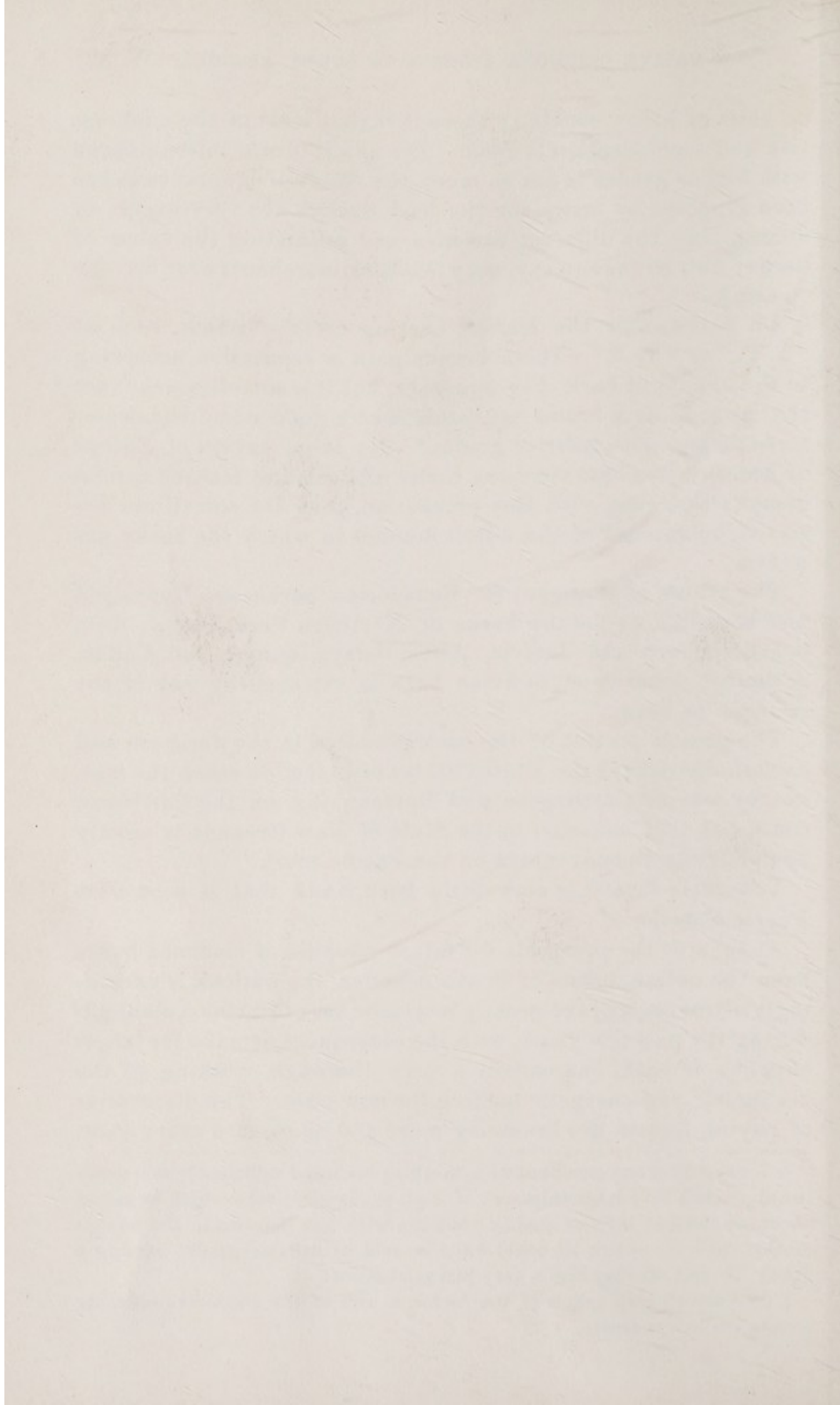
The greater portion of the bark produced in the northern and eastern districts of the United States of Colombia reach the market by way of Carthagena and Barranquilla, on the Caribbean coast, but that collected in the State of New Grenada is mostly shipped from Buenaventura on the Pacific coast.

Venezuela furnishes very little bark,† and that is sent from Puerto Cabello.

As regards the prospects for future supplies of cinchona barks from the native forests of South America, the outlook is exceedingly discouraging; the greatly increased use of cinchona alkaloids during the past few years, with the consequent demand for larger supplies of bark, has caused a very thorough working of the old forests, and energetic seeking for new ones. The discoveries of paying forests are becoming more and more rare every year,

* I was told of one merchant who, thinking his brand sufficiently well established, made a very large shipment of high-grade bark, with which he mixed about one-third of inferior quality; but the trick was detected in the foreign market, and his entire lot could only be sold as inferior grade, causing a heavy loss and serving him a very just punishment.

† The tapering-off points of the Andes, as also of the cinchona-producing forests, are in Venezuela.



and the new forests are found at greater distances from the shipping ports, and more difficult of access.

The tract of country yielding the cinchona is not so unlimited as some writers would lead us to believe, nor is the supply inexhaustible; it is a fact recognized by natives and dealers, who are well informed about the extent and resources of the cinchona-bearing districts, that if the present ruinous system of destroying the trees is continued, and no effort made to propagate new growths, they will, before many years, be practically exterminated from their native soil.

With the abundance of seeds yielded by the cinchonas one would naturally expect young plants to spring up in great numbers, but such is not the case; the light-winged seeds mostly fall upon and adhere to the ever-moist foliage, where they quickly germinate and decay; or, if, perchance, they fall to the earth, it is almost impossible to gain a rooting, as the soil is covered to the depth of ten to twenty inches with loose decaying leaves. Beyond all doubt the cinchonas might be successfully cultivated in their native country, especially in the localities of the exhausted forests; but the natives show no enterprise, and foreigners receive no encouragement from the government to attempt it.*

Two Germans have made a venture at cultivating cinchonas near the city of La Paz, Bolivia, but as yet the plants are not sufficiently developed to determine the results.

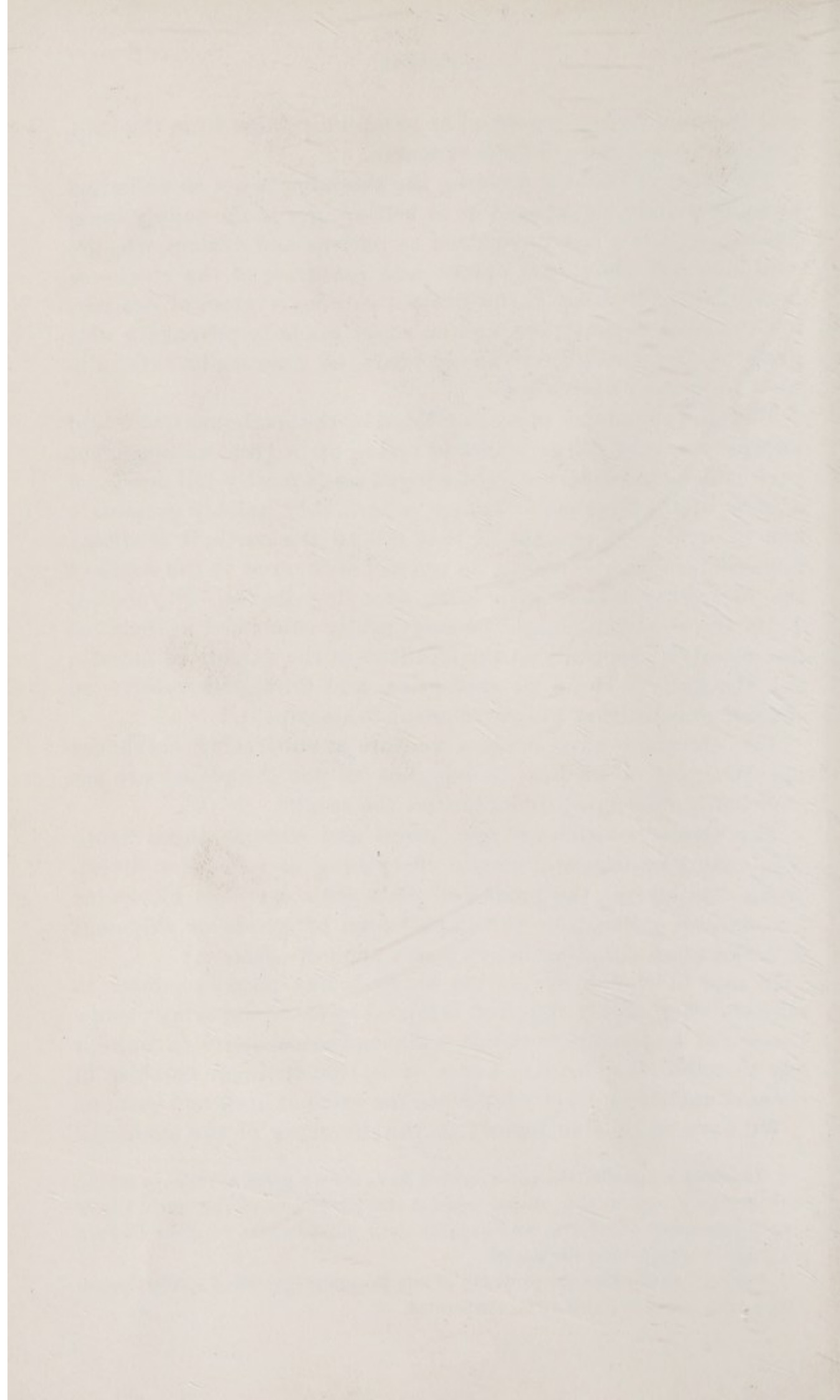
The almost continuous revolutions and wars in those South American countries so unsettle everything as to render investments hazardous; the roads and ports are sometimes blockaded for months, preventing the importation of goods or shipment of barks, often entailing heavy losses upon the dealers.†

In case of war or revolution every Indian peon is subject to military duty, and if required is forced to enter the army; sometimes it is impossible to obtain sufficient cascarilleros to make it pay to enter the forests; hence it is, that political troubles in those countries so greatly influence the price of bark and quinine.

We have no reliable history of the discovery of the medicinal

* The Dutch and British governments have shown great wisdom in taking such energetic measures to insure against the possibility of the world's bark supply becoming exhausted, and happily their experiments in their Eastern plantations are proving successful.

† During a revolution the property of any person suspected of sympathizing with a rival party is liable to be confiscated.



virtues of cinchona bark, and the question as to whether or not its therapeutic value was known to the Indians before the Spanish conquest is still a subject of controversy. Of the several legends extant regarding its discovery and early history, one is of a certain saint who saved the life of a very holy padre* by divulging to him the medical virtues of cinchona; this is told with several variations. The version which savors most of reality is that a padre was cured of fever at a small village, near Loja, by a decoction of cinchona bark administered to him by an Indian cacique.†

A legend which has gained wider circulation—probably on account of its romantic character—is that while a body of Spanish soldiers‡ was passing through the forests, one of their number was attacked by fever and left by the way to die. To quench his thirst he drank from a pool of water in which grew a cinchona tree; very soon he recovered and joined his comrades, heralding his salvador.§

The Spanish priests endeavored to destroy every relic of native civilization, giving as little credit as possible for the many valuable products which they obtained from the people whom they reduced from wealth and thrift to the most degrading serfdom; defiling their magnificent temples of worship, and forcing|| upon them a form of religion¶ which, to this day, they observe only as a ceremonial performance, hedged about, as it is, by superstition and ignorance.**

It was the policy of the conquistadors to appropriate to themselves†† all creditable things. This is, undoubtedly, the reason why we have no authentic history of the medicinal use of cin-

* Jesuit priest.

† Priest of the worshippers of the sun.

‡ After or about the time of the conquest of Peru.

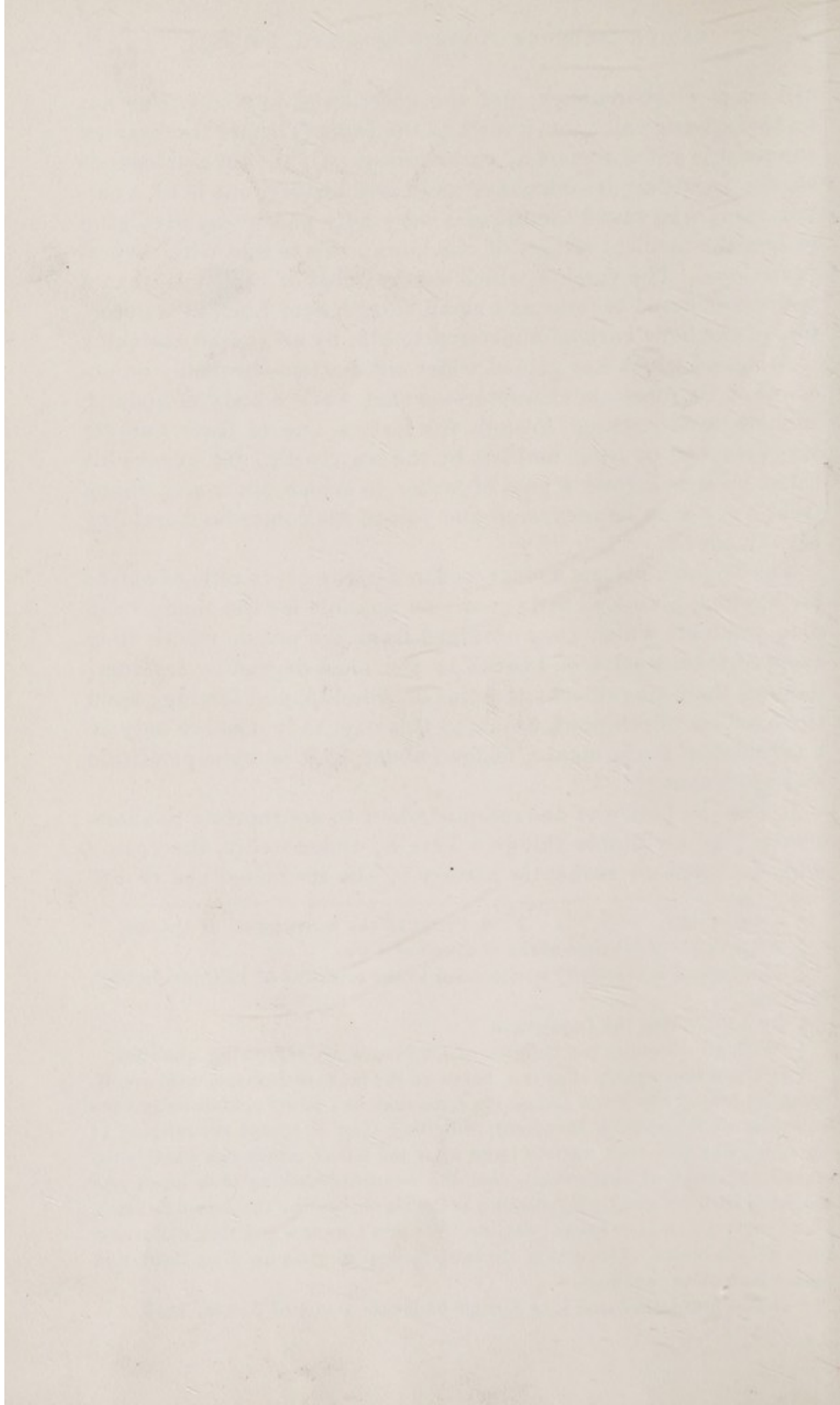
§ This legend is especially commended to the credulity of believers in high dilution.

|| By establishing the Inquisition.

¶ With all respect to the religion of Christ and its redeeming qualities.

** It is told that a party of priests, borne on the backs of Indians, went as missionaries among the Napa Indians (a tribe that had never acknowledged the authority of the Spanish invaders), soliciting them to accept the religion of the cross, like the other nations (who after the fall of Atahualpa humbly accepted the yoke of oppression); but the heathen, shaking their heads and laughing with derision, said (pointing to the slaves bearing the Jesuit fathers), "and carry you on our backs? Oh, no. We don't want a god that will transform us into beasts. Our god is the sun; he smiles upon us, gives light, and makes men of us, not dogs."

†† It was first introduced into Europe under the name of Jesuits' bark.



chona by the natives at the time of the invasion. It may be that its use was not general among all the Indian tribes, as the forests of Ecuador and Northern Peru* were the only sources from whence bark was collected by the Spaniards for nearly a century after it was introduced into Europe. However, this may be attributable to the fact that the Indians were (and they are now) very secret about the source of their remedies.

Several eminent travellers state (from hearsay I suspect) that the Indians could not be induced to take cinchona bark as a medicine, and that they would not believe it was sought by foreigners for other than dyeing purposes. If this be true, how is it that the term applied to cinchona bark by the Indians is *quinia-quinia*, which signifies medicine bark? Herndon and Gibbons state that the Indians of the Matto-Grosso country use an infusion of red cinchona bark, which they deem a very efficacious remedy for *calenturas*.†

Ecuadorian Indians told me that they regarded it a specific for fevers.

I was informed that pieces of the bark had been discovered in some of the ancient tombs; but I was unable to have this verified by positive proof.‡ It is very probable that such relics have been found, as I obtained specimens of *erythoxylon coca* leaf§ from the old Inca tombs in Peru.

It is a general belief among the natives that cinchona bark was well known and highly regarded as a remedy by their ancestors long before the Spaniards, under the daring Pizarro, invaded their coast.

* At the time of the conquest the whole of Western and Northern South America was known as Peru; hence the name Peruvian bark.

† Fevers.

‡ Experience teaches one to receive all statements made by the natives with due allowance.

§ Coca was cultivated and used by the natives throughout the country; it is still cultivated, but its use is not so general as before the conquest; more is consumed in Bolivia than elsewhere.

1a
Welcome!
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