lumbus set foot in the Lesser Antilles, thus bringing to a close the isolation of the Americas, a substance resembling paper was in use by the Maya, the foremost tribe of the Yucatán peninsula. The making of this beaten bark material, which was known as *huun*, went hand in hand with Maya intellectual development and finally with the advent of hieroglyphic writing; these ancient peoples actually constructed books.

The Maya made these hieroglyphic charts for centuries, even through the period of decline. When Maya civilization revived again in the tenth century, they had already begun to fold their *huun* paper into book form. In this period they produced a sacred almanac of forty-five pages still extant and known as the Codex Dresdensis. This remarkable polychromatic book, its characters and figures set down by some anonymous astronomer-priest of Maya-pan, was fashioned somewhere between A.D. 900 and 1100 (Figures 18, 19). If we can rely upon the Spanish chroniclers, this Codex was far from being the only manuscript produced by this ancient civilization; the Maya had many books; in fact, even extensive libraries. The Spanish missionary Diego de Landa, of the Monastery of Izamal, Yucatán, writing in the sixteenth century, said: "We found a great number of books written with their characters, and because they contained nothing but superstitions and falsehoods about the devil, we burned them all . . ." It was the Aztec, following the Maya, however, who developed the beating of bark into paper from a minor craft to a sizable industry. The Aztec peoples termed their beaten papers *amatt*.

More than forty years ago I visited the Otomi papermakers in southern Mexico and saw the procedure of their bark-beating in detail, but as this method of making "paper" is only remotely related to true paper formed from disintegrated fibre upon moulds, it will not be necessary to venture beyond an outline of the process. The bark, an inch or more in width, is taken from the trees in as long strips as possible. The dark outer bark is then removed, leaving the fibrous inner bark as the usable material. The inner

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* The *amatt* paper was made from the inner bark of a moraceous tree; of these trees there are 55 genera and over 700 species, of wide distribution, nearly 600 being comprised in the single genus *Ficus*. The family also includes the important genera *Morus* (mulberry), *Cannabis* (hemp), etc. Several of the species used for making paper were *Ficus padifolia*, *Ficus insculenta*, and *Ficus pettolaris*. 

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bark is boiled over a slow fire in a home-made cauldron containing water and wood ash. If the fibres are old and hard, a liquid residue obtained from cooking corn is used. (In this process the Mexican technique differs entirely from that employed in the Pacific islands, since the Polynesians do not resort to the boiling of the bark, as will be explained later.) The Mexican papermaking is done by women, as the men feel such work beneath their dignity;
The tools used by the Otomi Indians, Mexico, in making their paper. The grooved stones are of serpentine marble, and those with rounded handles are gabbro. The cut amatl-paper images (muñeco) are used in the practice of sorcery.

the men, however, do strip the bark from the trees. After boiling, the strips of bark fibre, having become disintegrated to some extent, are laid side by side upon a rectangular board that is a little larger in size than the dimensions of the paper being made. The strips of bark, each strip slightly overlapping the next, are then pounded and smoothed with a stone (Figure 20), or in some localities a smoothing tool is made by burning a concho until it becomes hard. After the strips of bark have been beaten and united into a sheet (Figures 21, 22), the board with its deposit of crude paper is placed in the sun to dry, when the stratum of fibre can easily be removed (Figure 23). Of all the primitive papers produced in the world, those of the Otomi Indians, Mexico, are perhaps the most crude. It does not require much imagination to liken the making of Mexican paper to the process used in fabricating papyrus; also, to a limited degree the making of the

Otomi paper is not unlike the beating of tapa. If we are not to be too particular in our generalization, we may loosely place papyrus, huan, amatl, and tapa in the same category—at least none of these substances is true paper made from disintegrated fibre upon porous moulds, the technique conceived and used by the Chinese Ts'ai Lun.¹

Tapu, or the Bark Paper of the Pacific Islands: It is not possible to examine the fine old bark papers of many of the islands of the Pacific Ocean without a sincere regret that these localities ever came under the influence of white men. This is especially true of the beaten bark papers produced many years ago by the Hawaiians, as these islanders were more adept in this craft than any other Pacific peoples. The old Hawaiian bark papers (called ka pa, meaning "the beaten") preserved in museums and private collections show perfection of workmanship that skilled technicians of the present day would have difficulty in duplicating. In Hawaii, as in the other island groups of the Pacific, the natives made their beautifully decorated bark papers for clothing and for use in their

¹ Notes, mostly of a bibliographical character, referred to by a superior figure in the text are to be found at the end of the book.
homes and for many domestic purposes. It was an important material with them as they had no cloth or textiles, and the garments of tapa constituted their main article of dress. After the advent of white men with their prosaic manufactured tools and printed woven cloth, the art of making tapa, or beaten bark paper, was soon cast aside, so there has been no craftsmanship of this kind practised in these islands for more than a hundred years. Today in this highly commercialized locality not a vestige of anything relating to this age-old industry remains, and, aside from exhibits in museums, it might never have existed (Figure 24).

Not only did the Hawaiians make and decorate bark paper, but
the craft was almost universal throughout the Pacific. Each island group, separated by hundreds of miles of ocean, had its own form of beating tools (Figure 25), its own technique of operation, and its own school of design. The principle of the operations, however, was the same throughout all the island groups. It is not known when this craft had its beginning; no records exist, its remote origin is shrouded in mystery.

The making of the beaten bark “papers” of the Pacific islands has no precise counterpart; these beaten tapas stand practically alone as an individual technique. Owing to the increasing present-day interest in the making of this material, I will set down extracts from my own observations as written almost twenty years ago after a year’s travel in dozens of the islands and atolls of the great Pacific Ocean. In the course of my investigations relative to the making and decorating of tapa I travelled many thousands of miles, visiting the Society group, the Hervey Islands, Hawaii, and other frequented localities of the Pacific. In these islands nothing could be found of the old craft and I became apprehensive that I had arrived seventy-five or a hundred years too late to see the making of bark paper undisturbed by the march of civilization, which always deals a death-blow to fine aboriginal craftsmanship.

Upon reaching New Zealand I learned that if the art of tapa-beating was practised in its original state anywhere, it would be in the Tongan or Friendly Islands, which lie to the southeast of the great Fiji group and off the regular line of travel. The Tongan Islands embrace about one hundred and fifty islands and islets in.

(15) New Hebrides beater, 14 widely spaced hoopai marks, weight 12 oz., length 11 in. (16) Solomon group beater, 15 rough hoopai marks, weight 17 oz., length 12 in. (17) Samoan shell (asi) used in the preparation of the mulberry bark (tutuga) for the making of bark paper. (18) Hawaiian bamboo liner used in decorating bark paper by dipping in dye and drawing across the material as a pen would be used. (19) Hawaiian bamboo liner which made six heavy lines, while the other tool (No. 18) made nine thin lines across the tapa. (20) Hawaiian bamboo Stamper or printing stick (okekapala) used many years ago in decorating paper. (21) Hawaiian braided coconut-fibre rope employed in the ornamentation of tapa; used as a carpenter uses a chalked cord. These tools were collected by me almost twenty years ago in the various localities where they were used.
THE WRITING SUBSTANCES OF THE ANCIENTS

with a territory of 256 square miles; the population, about thirty thousand. I was aware that tapa was still made on the island of Savaii, of British Samoa, and also on Tavuni, of the Fiji Islands, but only in small pieces and in a form different from the ancient.

On the last day of March 1926 I left Auckland for the Tonga Islands, via Fiji, and after eight days on a small ship arrived at Nukualofa, the chief village on the island of Tongatabu—that is, Tonga the Sacred. This island, the largest of the group, and the seat of the original government, is shaped like an irregular half-moon, with the villages of Nukualofa about the centre and the hamlets of Hihifo and Hahake at the extremities. The islets of Ata, Malinoa, Tau, Enaiki, and Eua surround the larger island, forming one of the most picturesque groups in the Pacific. I visited numerous islands of the Tongan group, and saw practised the old craft of tupa-beating and tupa-decorating, much as it was in the days of the early English explorer Captain James Cook. It is my desire to enter into rather minute detail regarding Tonga taping-making, as it will be only a few years before these island people, like those of the more frequented localities, cease this work entirely, and no first-hand records of a technical nature exist.

Upon reaching Tongatabu I went to the Wesleyan Mission House, as I had a letter of introduction to the Reverend Roger Page, an Australian, who had been among the Tonganese for over nineteen years and spoke the native language fluently. I found him a kindly and obliging gentleman, who, unlike the early missionaries of Tahiti, had tried to foster the old crafts and customs and had given every encouragement to the natives engaged in the making of bark paper. He acted as interpreter and arranged for me to see the entire process of making and decorating tupa.

The raw material being the most important item in the work, we first visited the outlying districts where the paper mulberry (Broussonetia papyrifera) was growing and saw its preparation by native women for use in papermaking. The trees do not appear to grow wild, but are cultivated in small clumps near frequented paths and roads accessible for working. The trees sprout from shoots, which are carefully planted and kept weeded until the stalks have reached a height of from twelve to fifteen feet, the trunks of the trees being slender and devoid of branches. The leaves are large and hairy on the outer side, growing in clusters

at the top of the slight stalk, and having much the appearance of the ornamental eucalyptus.

When the trees have reached the proper height and circumference for making into tupa, they are cut at the base, and after the leaf clusters are removed, the sticks are tied in bundles of a size suitable for conveyance. These bundles are soaked in a running stream or in a pool of fresh water until the outer bark becomes soft, when it is scraped away by the use of shells, leaving exposed the soft inner bark (fetaaki), clean and yellow-white. Next, each stick is cut perpendicularly from end to end, which allows the thin inner bark to come free from the stalk in a narrow strip, tapering from about three inches at the base to less than one inch at the extreme tip. The strips of inner bark are then laid upon the grass to dry and bleach. After sufficient exposure to the sun, the strips are made up into coils with the concave side of the bark outermost, which causes the material to assume a flatness that it would not otherwise have. In this form the bark is ready for the first beating, which is accomplished by heavy wooden mallets, called in Tonga ike. The prepared bark (called pakoko or hiapo) in rolls about twelve inches in diameter, each containing the inner bark of several trees, is distributed among the workers throughout the islands, who have had no part in the cultivation or preparation of the raw material.

In Tonga the growing of the bark and the making of the finished tupa (gatu) are more or less religious obligations, and the completed product is at present taken to the churches, where it is divided among the workers who had a part in its production. Unlike the Fijian and Samoan material, the Tongan tupa is rarely sold, and it is hoped that the making of this superior bark paper will never become commercialized.

The beating is undertaken by individual women artisans, who work before their huts in good weather and under shelter during the rainy season. While the old Hawaiians used a hand-hewn anvil, or beating-block, of symmetrical shape and studied form, the Tonganese, like the Javanese, have always employed a simple log, about fifteen feet in length, flattened along the top and supported at each end upon stones. The log, known in the Tongan language as tutue, remains in place from day to day as part of the furniture of the homestead. In Tahiti, Rapanui, and Samoa
the wooden anvil is also called tutua, and in Fiji dutua, which may show a common origin of the terms. This would also apply to other appellations of Polynesia and Melanesia in the making of bark paper.

The beaters or mallets (ike) of Tonga are identical with those of Samoa, where they are known as ie, and are made of heavy, dark-brown, close-grained wood (see Figure 25, tool No. 8). The Tongan-Samoan mallets differ in shape from all others and contain fewer grooves for the width of the faces than those of any other Pacific islands. I was told that the men made the beaters, but I have never seen or heard of a Tongan man beating bark. One old man near Neiafu, Vavau, told me he liked the sound of the beating, but he could not perform the task himself as it was too steady and too hard.

The Tongan women beaters sit before the log anvils, cross-legged, upon banana leaves or grass mats. Around the logs are strewn leaves and grasses to keep the beaten bark from being soiled by coming in contact with the dirty ground. The constant tap, tap, tap, a hollow resonant sound, can be heard throughout the inhabited sections of Tonga, and I was able to trace in this way the location of any number of scattered workers (Figure 26). The first woman I found beating was sitting well out in her yard in front of a small thatched hut, amid naked children, mangy dogs, and lean pigs. I watched her at work for three or four hours, and during this time she never ceased the constant beating. A strip of bark that had been soaking in water was laid on the log anvil and was struck at right angles, the mallet falling squarely upon the material. As she beat, the bark was pushed away from her over the anvil, falling in folds upon the leaves. At each stroke of the beater the bark became wider, and when twice its original width, the material was doubled and tripped and again beaten, being kept sprinkled with fresh water during the entire pounding. The woman would then take the material apart and put it together again in different order, beating all the while, either straight with the bark or at right angles. As she pulled the bark apart it would stick and sometimes tear, and she would mend the holes as she went along by beating small pieces of bark over them. This folding and beating was continued for hours, until the bark, which in its original state was barely three inches wide, had assumed a width of eighteen to twenty inches. Beating the bark in one layer would never have made this width; it was the lapping together of the narrow folds that caused the bark to become wider when the mass was beaten together. This action naturally reduced the length of each strip. Before one piece was beaten to its entire width, the worker would start a fresh strip, apparently allowing the former one to dry a little before continuing the beating. Water was used sparingly, as the bark was only lightly sprinkled every few minutes. I tried the beating and found it difficult and exceedingly
severe on the wrist, owing to the vibration of the long wooden anvil. (The Tongan beaters, called ike or tata, measure thirteen inches in length and weigh thirty-four ounces.) The women are ambidextrous and use both hands with equal facility, constantly changing when either arm grows tired. In Tongatabu I saw a dozen or more women at work beating tapa, and as many more on the island of Vava'u. The workers were all aged women and were dressed mostly in tapa, with gaily coloured seed-pods and leaves about their bodies. They were kindly and seemed desirous of showing me the entire operation of their work, although somewhat curious regarding my interest. They gave me custard apples, coconuts, and pieces of tapa, and always invited me to sit before them on the banana leaves. One extremely ancient artisan had a mallet so scarred and marked with usage that I wished to purchase it, but she insisted that I be content with a newer and less worn one that was lying unused at her side. No amount of persuasion could induce her to part with the old beater; she had used it many years, she explained, and it had become a favourite tool, one that her hands had grown to fit. After learning this I did not press her further, as I could appreciate her affection for the implement; I have favourite tools myself, although of a different nature. On my visits to Lifuka, of the Haapai group, and also Niuafo'ou, I could find no trace of tapa-making in these islands, although I found the decorated bark paper in use as wearing apparel and bed-clothing.

Of the several methods employed in the decoration and ornamentation of bark paper the method used by the Tonganese is the most ingenious and artistic, and is less contaminated by outside influence than any other means of decoration in the South Sea Islands. It was my rare good fortune to see this work being done on the island of Tongatabu, for the decorating, unlike the beating, is practised only at certain times and upon special occasions, as a great amount of beaten bark must first be made before any decorating is undertaken. I was on the island when the natives were making preparations for the celebration of the one hundredth anniversary of the founding of the Wesleyan Mission, in 1826, and many arrangements were being made for the festival. To see the complete process of tapa-making, a fairly long residence in the islands is necessary, as it is impossible to determine just

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**Fig. 27** Coconut-fibre printing mats (kupesi) made near Nuku'alofa, Tongatabu, Tongan Islands, South Pacific. These mats are used in the decoration of tapa and each measures 6 by 19 inches. The lettering on the two outside mats reads: Koe maka fakamanatu eni o sii tahina ko Meleami—"this stone is in memory of the dear girl Miriam." when the natives will be working on the material. When, for instance, a Tongan chief dies, all tapa-beating and decorating is suspended for a period of three months, and as there are numerous deaths, the work is constantly interrupted.

For the decoration of Tongan bark paper the old-time kupesi, or vegetable mats, are the principal implement employed. These mats (Figure 27) are made from several kinds of dried plants, which act as printing surfaces in producing designs on tapa, in much the same manner as an impression of a coin is made on a piece of paper by rubbing with a lead pencil or chalk. These mats
are of various shapes and sizes. The backings are composed of the flat leaves of either the coconut or the *Pandanus odoratissimus*, over which the mid-ribs or stems of coconut leaves are sewed to form designs by the use of the thin fibrous threads of the *fau* (*Hibiscus tilicaceus*). The mats, with their slightly raised, designed surface, are made up in innumerable shapes and patterns and are sufficiently flexible to bend in any form desired. From the illustrations of these *kupesi* the mode of their construction will be obvious, and while the method is primitive, their making is a difficult and tedious process. While in Nukualofa I called upon the native Queen’s old aunt, who makes the printing mats for the island, and she very thoughtfully explained the process of sewing and gave me numerous specimens of her work. She is an adept worker in this material, and when she is gone, there will be no one so skilled to carry on her occupation. The young Tongans do not bother with the making of bark paper, as they prefer the gaily coloured Manchester cotton to the beautiful bark material that played such an essential part in the lives of their ancestors.

When the time for decorating tapa arrives, the pieces of bark paper that have been beaten over a period of many months by the old women in different parts of the island are brought in great bundles to a central meeting-place (*kokaagas*), where the innumerable small pieces are formed into immense sheets and the ornamentation applied. The single sections as originally beaten by the individual workers are in the embryo state and are seldom used in this form except when a small, white, filmy tapa is required. The community house that I visited stood at the corner of two roads, in an open field, amid a few scattered grass houses, where naked children played with sore-eyed cats and dogs. The house was about forty feet square and open to the roof, and with its wooden floor about two feet from the ground, suggested that it had been built by the mission or by someone interested in fostering and preserving the native arts. These central houses were no doubt in use in the old days, for then, as now, considerable space and many workers were required in forming the large sheets of tapa and applying the decorations. The building was without decoration except for a native portrait of Queen Salote Tubou, the successor to the throne of her father, George II, but upon the rafters of the building there were stored huge rolls of completed tapa, called *tukui gatu*, some of which would measure dozens of yards square. These rolls had been made for the centennial of the mission and were so heavy and bulky that I saw two strong women fall under the weight of one when they attempted to carry it.

When I entered the community house on a cool morning in April, I saw six or eight women arranging many printing mats upon two long half-cylinder benches in preparation for the decorating of the bark paper. Each of these wooden benches was about twenty-four feet in length and thirty inches at the base, supported by short, stout legs which held the curved bench about six inches from the floor. The women told me that their ancestors had used a large log for this purpose, and that the introduction of the more symmetrical table composed of smooth, regular boards was the only innovation in tapa-making since ancient times. As I watched the workers, each half-cylindrical bench was being covered, with the exception of about two feet at each end, with the vegetable-fibre mats, forming one large pattern made up of separate units. The small mats were applied to the curved benches, and over each unit was laid a thin piece of bark paper, cut in the shape of the mat, but with about two inches of margin on all sides. The whole was then fastened to the wooden form by the use of Polynesian arrowroot (*Taccia pinmatifida*). The margins of the bark paper on each section lapped over the adjoining mats, but owing to the thinness of the paper they did not interfere with the use of the raised design of the mats in printing. Dozens of these small *kupesi* were carefully applied to the form, and much measurement and calculation were exercised by the women in getting so many different sizes and shapes to fit correctly. The margins of the bark paper at the under edge of the half-cylinder were turned under the bench and held in place with the arrowroot paste. The women worked all day in covering the two large curved forms, and when the work was completed the appearance was exceedingly precise, each half-cylinder suggesting a huge printing block. The covered tables were to be used the following day for forming the beaten-bark sections into large sheets and adding the decoration. To prevent the mats from drying out and coming loose during the night, a dampened piece of plain tapa was thrown over each form.

The next day when I entered the community hut, there were thirty-five women at work, and also a number of men, including
several chiefs with their wives. They all sat cross-legged upon the floor, clapping their hands and swaying back and forth, at the same time singing in their native tongue. The party was more festive than it had been on the previous day, and much kava was being drunk in the accustomed ceremonious fashion. Several women sat upon the floor at either side of each bench, so that their bodies were close to the curved printing tables and they could easily reach the tops. The small pieces of beaten bark that had been collected from the individual workers throughout the district were in great heaps upon the floor, the mass representing months of tedious beating. The pieces were from twelve to twenty inches wide and from four to six feet long; some of the small sections had been pasted together, forming strips of the same width, but about twenty feet in length. Both the small pieces and the long strips are essential in the building up of the large finished tapa.

The first operation was to place over the forms small pieces of the beaten bark which were fastened together at the edges by boiled arrowroot. In using this paste the skin of the tuber is cut as a lead pencil is sharpened. The root is the shape of the sweet potato, but of a grey colour when boiled, extremely glutinous, with tough, fibrous threads running from end to end. After one covering of bark paper had been laid over the design-form, another layer was applied, directly over the first, but joined at different intervals. The second thickness was pasted over the entire surface and any holes or tears were patched with small bits of the material. Each time a layer of bark paper was applied, the women would rub the outer surface with a dauber dipped in dark-red dye, which was rendered from the bark of the koka tree (Ficus prolixa). This process brought out the design of the mats in an all-over pattern, at first quite faint, but clearer upon drying; the design retaining a hazy, undefined appearance that gives the Tongan tapa such an artistic quality.

When the form was completely covered with two or three thicknesses of the small sections of beaten bark, one of the long, narrow strips was stretched over the top, reaching from one end of the form to the other. This was also fastened down with the arrowroot paste and rubbed over with the dye. The entire covering was then lifted from the curved bench and laid in the laps of the women who were on the receiving side of the table. To the edges of the completed piece next the form were then pasted other small pieces, until the form was again covered in the same manner as at first, making one continuous sheet. Every covering of the form table increased the length of the main tapa by about four feet, or the width of the table top. Each time the form was covered, one of the long, narrow strips was applied as described. These strips, running parallel with the length of the table, served not only as binders but as marks to determine the size of the finished tapa, for every time one of these long strips was added, the women would mark its ends with a figure or hieroglyphic, so that they were able to tell, as the work progressed, just how many strips had been applied, thus giving a rough estimate of the length of the tapa. By the curved-table method of Tonga the sheets of the tapa can be made endless in length, as it is simply a matter of the number of small beaten sections at disposal and the amount of wear the vegetable printing mats will endure. As the tapa grew longer it stuck more and more to the curved form, and after the decoration of a hundred or more feet of the material the mats had become well saturated with the arrowroot paste and the dark-red dye. Following the building up and staining of a large section of tapa, the printing mats are removed and repaired, then used again, but as they would seldom be laid against the curved table in the same rotation, each tapa would bear a varied series of designs.

After the bark paper has been completely formed and decorated, it is spread in the sun until the arrowroot paste and colouring pigment have dried; it is then folded along its width, rolled into a large bundle, and laid away until the finishing touches can be added. The pasting of the small pieces is performed with such perfection that the completed tapa appears to have been composed of one continuous piece of beaten bark and only a close examination will reveal the lapping of the numerous sections.

For the final treatment the tapa is again spread on the ground and held in place by stones. The barefooted women walk over it, adding free-hand lines around the dyed designs, detracting from rather than enhancing the soft beauty of the all-over pattern. These lines, about half an inch in width, are drawn with pieces of glass, bits of slate, or bamboo sticks dipped in dark-brown dye made from the charcoal of the shell of the candlenut, called in
Tonga *fukai tuitui* (*Alcuretes triloba*). This dye produced a shiny or glossy surface in contrast to the hazy all-over pattern imprinted by the vegetable mats. The large pieces of *tapa* are cut to suit the requirements of different individuals and are made in great sizes to expedite the manufacture, much as cloth is woven in large sections and cut to suit the purchasers. The labour required in the preparation of the bark, and in the beating and forming of a piece of decorated Tongan *tapa* twenty by one hundred feet, is tremendous, as it would require the time of thirty-five women at least two and a half months to perform the complete operation (Figure 28).

During my voyage in the Pacific Ocean almost twenty years ago it was my privilege to see *tapa* being beaten and decorated in the islands of Tonga, Fiji, Samoa, and Celebes (Figures 29, 30), but in all other islands where I had hoped to find at least a remnant of the craft I was disappointed. In each of the island groups the beating-mallets are of a different form and weight and the mode of applying the decoration to the bark paper varies to a marked degree; but, as previously mentioned, the principle of the operation and the type of bark used are almost identical throughout the Pacific. The methods employed in the Tongan group a quarter century ago were least contaminated by outside influence and therefore the most enlightening and interesting.

Although this chapter is headed “the writing substances of the ancients,” the *amalt* paper of the Otomi Indians of Mexico and the bark-paper taps of the Pacific islands have never been used for calligraphy. The Otomi paper, unlike that of ancient Maya and Aztec civilizations, upon which technique it is founded, is used...
in witchcraft and black magic. The Otomi Indians cut images (muñeco) in their paper and use them in many different ways of sorcery. To cite but one observation: when I visited among the Otomi Indians more than four decades ago, the quiet village was in subdued commotion and I could sense that something was being concealed from me. I learned that one of the young Otomi men had been accused of an unpardonable crime and the authorities had taken him to the town for trial. Throughout their village the relatives and friends of the young malefactor were secretly making amant-paper images of the judge who was to pronounce the sen-

Fig. 30 Primitive paper clothing made by beating the moistened inner bark of the mulberry tree until the narrow strips are widened into thin sections. Although this material is not true paper, it is nevertheless more closely related to paper than it is to cloth. These six specimens of "bark paper" or tapa were made in Samoa, Tahiti, and the Congo and date from 1868 to 1883.
II

Ts’ai Lun and the Invention of Paper

THE INFLUENCE OF CALLIGRAPHY UPON PAPER AND THE INFLUENCE OF PAPER UPON PRINTING

Before the invention of paper the Chinese scribes wrote with a pointed stylus upon strips of wood or bamboo, but this material was difficult to write upon and difficult to store, for the wooden strips tied into bundles for the orderly preservation of records were cumbersome and consumed much space (Figure 31).

After many centuries of use by the Chinese scribes the strips of bamboo were succeeded by woven material as a writing substance, especially after the introduction of the hair brush, an invention attributed to Meng T’ien in the third century B.C. The cloth adapted itself readily to the purpose of calligraphy, or writing with a brush in the Chinese manner, (Even in Europe and America at the present time it is not unusual to employ cloth for both writing and printing, the material being entirely practical for these uses.) The Chinese made books and scrolls of woven cloth, and as there was much waste when the textile was cut and trimmed, it is only natural that an ingenious artisan conceived the idea of beating the discarded cloth into fibre and forming sheets that could also be used for writing. Cloth was expensive and even in ancient times, as at present, there was a desire to produce necessary material quickly and cheaply. It was probably the narrow strips of waste woven fabric trimmed from the edges of the primeral manuscripts and documents that first suggested to the ever practical Chinese mind the idea of making paper. It is possible that the Chinese conceived the thought of matting and intertwining the fibres into sheets of paper through their knowledge of felt-making, a craft which antedated even that of weaving.

The date usually given for the actual invention of paper is
THE INVENTION OF TRUE PAPER BY TS’AI LUN

A.D. 105, but this date is chosen rather arbitrarily, since the first experiments in papermaking from disintegrated fibre probably extended over a long period before the process was actually brought to any degree of perfection and publicly announced. The date A.D. 105 is usually cited as the time of the first papermaking because in that year the invention was officially reported to the Emperor by the eunuch Ts’ai Lun (Figure 32). It is not known whether Ts’ai Lun was the actual inventor or simply the court official who became the patron of the invention, but with the Chinese people themselves the name of Ts’ai Lun will always be closely identified with the beginning of papermaking. Every schoolchild in China is familiar with the couplet: “Ts’ang Chieh * made characters and Ts’ai Lun made paper.”

An ancient Chinese scholar has this to say about the illustrious Ts’ai Lun: “Under the reign of Ho Ti † (A.D. 89–105), Ts’ai Lun, of Lei-yang, conceived the idea of making paper from the bark of trees, discarded cloth, and hemp well prepared; the paper was then in use in the entire universe.” The following biography of Ts’ai Lun was compiled in the fifth century of our era by Fan Yeh ‡ and appeared in the official history of the Han Dynasty:

At the close of the reign of Yen P’ing (A.D. 106), Ts’ai Lun was employed at the court and later he was made a member of the Imperial Guard. The Emperor Ho Ti, upon his accession, learning of Ts’ai Lun’s superior qualities and talents, named him private counsellor and he was not spurned by His Majesty in either praise or criticism. In the ninth

* Ts’ang Chieh is the mythical inventor of Chinese characters, about 2700 B.C. (See The Evolution of Chinese Writing, by G. Owen, King’s College, Oxford, London, 1910; page 6.)

† The Chinese scholar Fan Yeh (范曄), who was born A.D. 398, prepared at least two sections of the History of the Later, or Eastern, Han Dynasty (Hou Han Shu 後漢書). Fan Yeh was responsible for the memoir of Ts’ai Lun (蔡倫) (Ts’ai Lun, ch’ian 8), a chapter containing biographical sketches of certain eunuchs, of which the inventor of paper was one. The writings of Fan Yeh were not incorporated in the famous history until after his death, A.D. 445. The Hou Han Shu is one of the original twenty-four official histories of the dynasties prepared under government supervision, and to a great extent the 120 volumes were compiled by individual Chinese scholars such as Fan Yeh. The books, covering the period A.D. 25–220, were annotated by Li Hsien, heir to the throne of T’ang, A.D. 651–684. The books were printed by Imperial order, A.D. 990–994.

‡ The invention of paper, A.D. 105. From a kake-mono produced by a Japanese artist in memory of Seibei Mochizuki, who established papermaking in Hishijimamura, Japan, in 1572. Of interest because it depicts, along with Mochizuki, the imaginary portraits of Ts’ai Lun and Dokyo, the Korean monk who introduced paper into Japan. Ts’ai Lun, in conventional dress, stands in the centre, Dokyo (left) is shown as a Buddhist monk, and Mochizuki, in formal costume, is holding a “laid” mould-cover. No authentic portrait of Ts’ai Lun exists.
THE INVENTION OF TRUE PAPER BY TS'AI LUN

year of the reign of Yung Yuan (A.D. 97), Ts'ai Lun was made inspector of works and through his efforts the engineers and workmen by the use of fine materials and skill produced swords and arms that served as models for future generations.

In ancient times writing and inscriptions were generally traced upon pieces of bamboo, or upon strips of silk, which were given the name chih (paper). But silk being costly and bamboo heavy, these two materials could not be used conveniently. It was Ts'ai Lun who conceived the idea of making paper from the bark of trees, hemp waste, old rags, and fish nets.

He made a report to the Emperor, the first year of the reign of Yüan Hsing (A.D. 105), upon his researches in papermaking and was highly commended upon his competency. In the first year of the reign of Yüan Chiü (A.D. 114), the Imperial Mother gave Ts'ai Lun the honourable title of Marquis for his lengthy service at the palace; the government accorded him the ground-rent taxes and the proceeds from three hundred dwellings. Later Ts'ai Lun became one of the chiefs of the palace.

In the fourth year of his reign (A.D. 117), the Emperor, finding that there were some faults in the books of history, ordered two competent scholars to attempt the correction of these faults, according to the rules adopted by the Han Dynasty. It was Ts'ai Lun who was placed in charge of this important work of correction.

Ts'ai Lun received of the Empress To a secret order to invent slanders against a member of the Imperial family. After the demise of the Empress the successor to the throne was an Emperor of less animosity and he ordered Ts'ai Lun to give himself up to the Minister of Justice so that he might be judged. Ts'ai Lun experienced such profound remorse and shame that after bathing and dressing himself in his finest and most elaborate robes, he drank poison.

Ts'ai Lun's residence was situated in the district of Lei-yang, which belongs today to the department of Hengchow, province of Human. Early writers relate that near the home of Ts'ai Lun there was found a pool, and south of the pool, at the west of the house, there could be seen the stone mortar that had been used by Ts'ai Lun in the maceration of his material for papermaking. This mortar was offered to the Emperor in payment for some ground rent and he had it placed on exhibition in the Imperial Museum. It is said that this mortar was still preserved as a curiosity in the Tang Dynasty (A.D. 618–907). The honour tendered such a modest appliance spoke highly of the esteem in which Ts'ai Lun and his in-

vention were held by the Emperor. Improvements in the process of papermaking were advanced by Tso Tzü-yi, a young apprentice to Ts'ai Lun, and the craft of forming sheets of paper spread throughout the Empire. The records of following centuries contain many references to the use of paper, not only for writing and bibliographical purposes, but for ornamental use in Chinese houses and temples.

The people of Japan had communication with Korea from early centuries and it was from that locality, then part of China, that the Japanese, at the beginning of the seventh century of our era, gained their first knowledge of paper when sheets of this substance in the form of manuscript books fabricated from the bark of the paper mulberry (Broussonetia papyrifera) were brought to Japan by Buddhist monks. Ancient records inform us that the Japanese began the craft of papermaking about A.D. 610, over five hundred years after Ts'ai Lun had conceived the art in China. It is thought that a Buddhist monk named Dokyo was the actual person who brought papermaking to Japan. Dokyo was learned in painting, ink-making, and papermaking, and aside from these accomplishments he was a physician. This versatile monk eventually became chief physician to Empress Shōtoku and within a short period after his appointment he gained unusual influence over the Empress, being made her most trusted adviser. While paper had its origin in China, the first printing was actually accomplished in Japan; and, what is more surprising, the original printing was sponsored, perhaps invented, by a woman, the Empress Shōtoku. (See Chapter iii for account of the world's first printing.)

From China, by way of Korea, the Japanese received their knowledge of the arts, and of agriculture, religion, philosophy, ethics, medicine, and science. The Japanese did not even possess a written language until the third century, when Chinese characters and literature were introduced to them by Atogi, a son of the King of Korea, who visited the court of Japan about A.D. 286.4

After the Chinese artisans imparted their knowledge of papermaking to the Japanese, the craft spread rapidly in the Island Empire and during the Nara period (A.D. 708–806) paper was being made in nine different provinces, and in the Heian period (A.D. 806–1135) forty provinces of Japan were engaged in this manufacture.4 By the eighth or ninth century the Zushoryo (department
of the library where the books, drawings, and paintings belonging to the Emperor were stored) had set up a paper mill with a guild of four expert papermakers. This establishment was created with the hope of influencing papermaking in Japan. In the year 807 this guild introduced papermaking in the neighbourhood of Kyōto, always one of Japan's great artistic centers. At the close of each year the various mills that had been established contributed 20,000 sheets of the finest plain paper to the Kuraryō, the keeper of the Imperial storehouse where the Emperor's personal clothing, gold, silver, and curios were housed. This tribute paper, along with 4,600 sheets of coloured paper from the ancient papermaking province of Mino, was used by the Imperial court.

With the decline of the whole central administration during the Heian period the Zushoryō ceased to have such extensive importance and the slave-like guild of papermakers, which had heretofore been kept apart from their contemporaries, gradually merged with the common people and it was not long before the entire Imperial staff was reduced in number and talent. Because of the absence of materials, paper, and skilled workers, the owners of private estates began the erection of small paper mills and they endeavoured to induce the former Zushoryō papermakers to resume their work for them in the fabrication of paper. Up to this time about the only materials used for the making of paper in Japan were the mulberry, gampi (Wikstroemia canescens), and hemp (Cannabis sativa), but as early as 1081 it was recorded that waste paper became a useful material for remaking into sheets of paper. The Chinese, no doubt, had used the method of reclaiming material much earlier, and insasmuch as the Japanese received nearly all of their ideas from China it is reasonable to surmise that there was no exception in this instance. In Japan the remade paper became the sole commodity of the paper-shops (kamiya) and was known by the name of kamiya-gami, literally paper-shop paper. The reclaimed material used in the making of the kamiya-gami was charged with ink and pigment and therefore the paper manufactured from the used material was of a grey tone. It has been stated that even books from the Imperial Library were macerated into pulp to be formed into sheets of the shukushi paper, always of a dull colour due to the writing on the paper from which it was fabricated. The demand for this paper continued, and to meet this need in the fifteenth century, guilds, called za, were established. In 1522 there were the upper and lower shukushi-za, the upper headed by the Togai family and the lower by the Osaji family. Both of these families were hereditary officials of the Zushoryō, or Imperial Library, and they had access to quantities of old manuscript books and written papers, which were rebeaten into pulp for use as papermaking material in their mills. In the Edo period there were six councillors, three foremen, and 121 paper workers in Kyōto and Fushimi under the jurisdiction of these two influential Japanese families, all making the reclaimed paper, which was highly esteemed throughout Japan.

At the present time the Japanese manufacture a vast variety of papers by the traditional hand process and in the early centuries of the craft there was also this abundance of varieties. The names Danishi, Sugihara, Hanshi, Torinoko, and scores of other appellations are as familiar today as they were centuries ago.

The exact date of the origin of papermaking in Echizen, one of the great Japanese papermaking districts of the present day, is not known, but there is a fanciful local legend that purports to be ancient. A certain deity, so the legend goes, revealed himself by the side of the stream, and, disguised as a beautiful woman, he placed a part of his kimono upon a bamboo stick in imitation of a papermaking mould; this he then dipped into the stream and shook as if in the act of forming a sheet of paper. The villagers upon seeing the strange happening were much excited and astonished and implored to be told the significance of the unusual actions. The reply, according to the story, was: “The soil of this dukedom is poor and lacks fertility, but the water from the mountain streams is pure and clear. I shall therefore teach you papermaking so that all may live by this craft.” The villagers asked who the stranger might be and received only the reply: “My name is

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8 The name Torinoko paper literally means “egg” paper, due, no doubt, to the paper having somewhat the tone and texture of eggshell. After the draft of the Versailles Peace Treaty, following the first World War, had been formulated and was ready for the final engrossing, there was considerable speculation as to what paper would be chosen by the authorities for inscribing this important document. Numerous makes of paper were examined and eliminated and finally the selection rested with just two papers: the famed Whatman handmade paper made in Kent, England, and the Torinoko handmade paper of Japan. For political reasons it was at last agreed to use the Japanese Torinoko paper, a choice that proved none too appropriate.