

LAND TITLES AND SURVEYS IN HAWAII

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by  
Arthur C. Alexander

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### Introductory Note.

The following article was written for presentation to a small gathering of well-informed men and the subject is not treated in as extended or as complete a manner as would have been the case if it had been written for publication. Anyone wishing to go further into the subject is recommended to read a "Brief History of Land Titles in the Hawaiian Kingdom," by W. D. Alexander, published as an appendix to the Surveyor General's Report in 1882 and reprinted in Thrum's Annual for 1891; and also a series of articles on "Land Matters in Hawaii," by C. J. Lyons, published in the "Islander" in 1875 and reprinted in the Report of the Surveyor of the Territory of Hawaii for 1902. The various Acts of the Legislature under which the Land Commission was organized and operated may be found in the Appendix to the Revised Laws of Hawaii, 1905.

For the benefit of other surveyors a list of those who did surveying for the Land Commission is appended (Appendix A) to this article with brief comments on the quality of their work and their individual peculiarities. In preparing this list the writer has drawn freely on the experience of others as well as his own, and wishes here to express his indebtedness to those who have helped him with their comments. There is also appended (Appendix B) a discussion of the rate of change in the magnetic declination in Hawaii.

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### HAWAIIAN LAND SUBDIVISIONS

Some knowledge of the ancient system of land subdivision in Hawaii is necessary in order to understand the peculiar situation that has developed from it.

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<sup>1</sup> Manager Land and Survey Department, American Factors, Ltd.

The largest subdivision of land was the "moku," or district. Each of the four largest islands was divided into several such districts, the names in many cases being repeated, as the windward districts of Koolau and Hamakua and the leeward district of Kona, which appear on at least three islands. The moku seems to have been a geographical subdivision only. There were no lords or administrators over these districts, as districts.

Each moku in turn was divided for land holding purposes into a series of lands called "ahupuaas," varying greatly in size and shape. Theoretically each ahupuaa contained a "kai" (sea fishery), a stretch of "kula" (upland), and some "kuahiwi" (forest and mountain land), so that it could furnish everything that might be needed by the holding chief and his retainers for their support. As a rule, the ahupuaas consisted of strips running from the sea up the mountain side and were usually bounded by natural features, such as gulches, ridges and streams. In many instances the ahupuaa, instead of being a continuous strip, consisted of a number of detached pieces called "leles." This was particularly the case where a large number of lands were crowded into a comparatively small area, as in the vicinity of the larger towns.

The ahupuaas were subdivided into smaller lands, called "ilis," the arable portions of which in turn were divided into small tracts, called "mooos," or "mooainas." These last subdivisions were for purposes of cultivation only. The names of the mooainas were in reality field names. The ilis varied even more than the ahupuaas in size and form, leles being the rule rather than the exception. A distinct type among the ilis was the "ili kupono," or simply "ili ku," which was an independent subdivision for land holding within the ahupuaa. In some cases, as in the ahupuaa of Hanapepe on Kauai, where the big independent ilis of Elelele, Kuuiloa, Koula, Manuahi, etc., took up practically all the land that was of value, the ili kuponos are of more importance than the ahupuaa itself.

The original subdivisions were made some time in the far distant and obscure past and have been rigidly adhered to ever since. It was the business of the inhabitants of any land to know its boundaries definitely, so that they could keep off trespassers and not trespass themselves on adjoining land. This knowledge was imparted by taking them at stated intervals on a pilgrimage around the land. The elaborate subdivision of the land is evidence of the teeming population that once existed here, which is corroborated by the testimony of early visitors and the evidences of cultivation that we find everywhere. In ancient Hawaii there was no unoccupied land. It was all "taken up."

## ANCIENT SYSTEM OF LAND TENURE.

Originally the ultimate title to all land was vested in the reigning chief. No one could hold or occupy land without his consent. The communal, or tribal, system of land tenure existing in other parts of Polynesia did not exist here. The lands were parcelled out among the principal retainers of the king on his accession and their tenure was not usually disturbed so long as they rendered the service and tribute exacted by their sovereign. To have disturbed them might have fomented dissatisfaction and revolt,--a condition to be avoided. The number of lands granted any chief varied with his rank and influence. Under the chiefs the arable land was parcelled out again among the common people living on the land, who in turn rendered various services to their landlord and cultivated certain pieces of land called "koeles" for him. In later years the tenants worked on the koeles once a week, on Friday, and these came to be called "poalimas," poalima being the Hawaiian word for Friday. The tenants as a rule did not migrate and lived on the same lands for generations. The fact that the landlord was dependent on them for service both in peace and war tended to render their tenure more stable. As may be seen it was strictly a feudal system, with this distinction, that the tenure of land was entirely dependent on the life of the sovereign or his ability to maintain the throne.

The name "konohiki," meaning originally the landlord's agent in charge of the land, came in time to be applied to the land under his care, "konohiki land" meaning land held by a chief, i. e. an ahupuaa or ili; and the name "kuleana," meaning originally "rights," came to be applied to the land held by the tenant. I shall use both terms in this way throughout this paper without further explanation.

## LAND COMMISSION AND "MAHELE" OF 1848.

Prior to the establishment of the Land Commission, transfers of land, in order to be valid, required the approval of the king and premier. There was no such thing as a fee simple title. With the advent of foreigners and foreign business methods, it soon became apparent that a radical change would have to be made in the system of land tenure. Fortunately the king, Kamehameha III, and the leading chiefs were thoroughly alive to the situation. In 1846 there was formed a "Board of Commissioners to Quiet Land Titles," commonly known as the Land Commission. This Commission as first organized consisted of two white men, two full-blooded Hawaiians and one half-white. John Ricord, the attorney general, was chairman of the board. It organized and began

its labors on February 11, 1846, and it was not dissolved until March 31, 1855, nine years later. It sat as a court of record, with power to confirm or reject all claims to land arising prior to December 10, 1845. All claimants to land were required to file their claims before the Land Commission for confirmation before February 14, 1848, or be forever barred.

I have not time to go into the details of the great "mahele," or division, of the lands that took place in 1848. The king, to his everlasting honor, voluntarily gave up all his rights in the land, which was divided ultimately into three portions,--one to the chiefs, one for the support of the government, and the third for the sovereign's personal use. These we know by the names of Konohiki, Government, and Crown Lands.<sup>1</sup> A one-third interest in the konohiki lands was retained by the government, and in order to get an allodial title in fee simple the payment of "commutation" to the government was required, either in land or in cash equal to one-third of the unimproved value of the land at the time of the mahele. Out of the konohiki lands were taken the holdings of the tenants, the "kuleanas." Thus the chiefs had to give up one-third of their lands to the government and a theoretical one-third to their tenants. It was only after a long and earnest discussion in the Privy Council that they consented to do this. It was a great sacrifice on their part for the common good, but at the same time they obtained fee simple titles that could not be disturbed, except by due process of law. The kuleanas, as finally decided, were exempt from commutation, except in the town of Honolulu, Hilo and Lahaina. This was on the theory that in the country districts the government commutation having already been paid by the konohiki, the kuleanas ought to be exempt, while the town lots, not having been taken out of konohiki land, ought to pay commutation.

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<sup>1</sup>This division is recorded in the so-called "Mahele Book." In this book the lands held by each chief are entered in two lists on opposite pages. The king signed one list quit-claiming those lands to the chief and the chief signed the other list quit-claiming the remaining lands to the king. After this subdivision was made, the king made a second subdivision of the lands given up by the chiefs, setting aside the main portion for the support of the government and retaining the rest for his own use. This second subdivision was inserted in the "Mahele Book" after the first, the two resultant lists being both signed by the king.

The Land Commission worked with great energy and singleness of purpose and accomplished a most difficult and arduous task. They made many mistakes, but when one considers that nearly 12,000 individual claims were adjudicated by the commission, involving visits to all the principal islands and the hearing of a mass of testimony, it is surprising that more mistakes were not made. The work required haste in order to insure its completion, as there were many exigencies that might have stopped and undone all that had been accomplished, as, for instance, the death of a progressive ruler in entire sympathy with the work of the commission and the succession of one less liberal and helpful. The sins of the Land Commission were sins of omission rather than of commission, and are being gradually corrected as they come to light. Whatever injustices were committed were unavoidable under the circumstances.

#### BOUNDARY COMMISSIONERS.

It was manifestly impossible, with the limited time available and the scarcity of surveyors, to survey all the konohiki lands, and in 1852 the Land Commission was empowered by Act of the Legislature to grant awards on konohiki lands by name only and without survey. Some ten years later, by another Act of the Legislature, Boundary Commissioners were created, to whom the owner of any konohiki land might apply for the settlement of its boundaries.<sup>2</sup> It is nearly fifty-eight years since the first Boundary Commissioners were appointed, and yet there are a surprisingly large number of lands whose boundaries have never been surveyed or settled. In the district of Lahaina, for instance, there are over twenty such lands. The difficulties in the way of determining the boundaries of these lands have been increased immeasurably by the death of all the old "kamaainas" who were familiar with these boundaries. In order to close up the work of the Boundary Commissioners the last Legislature passed an act requiring the surveying and settling of all such boundaries within four years from July 1, 1919, and it is to be hoped that this will be accomplished.

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<sup>2</sup>At first there was a Boundary Commission, consisting of two members, appointed for each judicial circuit; then the plan of a single Commissioner for the whole group was tried, and finally, in 1863, the present arrangement of a single Boundary Commissioner for each judicial circuit was adopted.

## AWARDS, PATENTS AND DEEDS.

Many of the owners of konohiki lands assigned to them in the mahele failed to apply for Land Commission Awards within the allotted time. For the relief of these, an act was passed in 1860 empowering the Minister of the Interior to grant awards on these lands if applied for before the last day of June, 1862. Sixty-four awards, known as "Mahele Awards," were issued under this act.<sup>3</sup>

By Act of the Legislature in June, 1848, certain government lands in the district of Honolulu were set aside for the support of the garrison at the Fort, known as "Fort Lands." In 1851 these lands were sold at auction, after fifty acres had been reserved for the Royal Hawaiian Agricultural Society. A series of separate awards for these lands was issued by the Land Commission, designated by the letters "F. L." (Fort Lands). This makes three classes of awards, -- (1) the Land Commission Award pure and simple, (2) the Land Commission Award F. L., and (3) the Mahele Award.

These awards conveyed a title to the land "less than allodial," under which, by Act of the Legislature in 1854, the owner might bring any action at law as if he "had received a Royal Patent for the same." The holder of an award was entitled to a Royal Patent in confirmation of his title on application to the Minister of the Interior and the payment of the commutation, but, as they could not be dispossessed of the land, quite a large number of owners were content to let things run on as they were without applying for patents. It was only a few years ago that a law was passed providing for the appraisement of the commutation on all lands subject to commutation that had not been patented and adding of interest to the commutation if not paid before a certain date. This has resulted in patents being issued on most of the unpatented awards.

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<sup>3</sup>A second act for the relief of delinquent konohikis was passed by the Legislature in 1892, whereby the Minister of Interior, under certain conditions, was "authorized to issue Royal Patents (Grants) to all konohikis, or to their heirs or assigns, where such konohikis failed to receive awards for their lands from the Land Commission or from the Minister of Interior as provided by the Act of August 24th, 1860." This Act remained in force until June 1, 1895, on which date all unawarded and unassigned lands became finally the property of the government.

In addition to the patents issued in confirmation of awards, there are three other classes of patents,---(1) patents issued on government land sales and homestead lots, known as (Grants); (2) a few patents issued on government lots and remnants in Honolulu, known as "Public Works Grants" and designated by the letters "P. W.," and (3) patents issued in 1883 to the Board of Education on various school and church lots throughout the islands. The government in recent years has also conveyed title by quit-claim and exchange deeds, and the writer knows of at least one so-called "adjustment deed," but in this case the land was also covered by a patent. There are many cases where more than one award or where an award and grant were inadvertently issued on the same land. Examples are also common, particularly in recent times, where one title has been knowingly superimposed upon another. This has happened where the government has acquired land already under patent or award and has reconveyed it in parts, issuing patents for these parts. All this has tended to increase the complexity of our land titles, already complex enough.

The crown lands, until 1865, when an act was passed making them inalienable, were treated by the sovereign as his own private property and freely sold to fill the royal purse, which suffered from chronic depletion. These conveyances of crown lands are known as "Kamehameha III and IV Deeds." They add another element of complexity to our system of original land titles,--a system that has simply grown without plan or forethought.

*more of interest*

#### COMPLICATIONS TITLE.

The Land Court, established in 1903, was expected to simplify matters by uniting in one title adjoining groups of heterogeneous titles. In time, it will do so, but up to the present it has tended to complicate rather than simplify.

To show the heterogeneous character of Hawaiian land titles let us take a hypothetical case. Suppose a tract of land comprising originally four separate pieces, consisting of (A) land awarded and patented, (B) land awarded and not patented, (C) land awarded by name and not patented, (D) land registered in the Land Court, is subdivided into lots for sale. The lots are put on the market at prices depending solely on the character of the land and their relative positions and not in any way on the title. The purchasers of lots containing only portions of (A) obtain titles that are complete. The purchaser of a lot containing part of (B), although he pays the same relative price, to perfect his title must have a description prepared of the unpatented portion of his lot, pay commutation on it and pay for a patent. If the lot contains part of (C), after having had a survey made of this part, the purchaser will also have to go before the Boundary Commissioner and get a Boundary

Certificate before he can pay the commutation and get a patent. If there is a part of (D) in the lot bought, he must have a plan and description prepared of this part for the Land Court so as to get a Land Court Certificate of Title for it. If he is unfortunate enough to buy portions of two or three of these pieces, he may have to pay for his lot twice over before he can get a clear title. This is an extreme case, but it illustrates well the want of simplicity in our land titles.

#### CHARACTER OF EARLY SURVEYS.

The greatest defect of our land system, however, has not been its complex character, but has been the imperfect character of the earlier surveys and descriptions. Under the conditions existing at the time of the Land Commission the wonder is that so much good work was done. With ten or twenty thousand surveys to be made at the same time, with no trained surveyors to be had, and with a limited supply of rather inferior instruments, the Land Commission were absorbed in the legal phases of their work and did not seem to realize the importance of accurately describing the lands awarded. A remarkably able statement of rules and principles was drawn up for the guidance of the Commission, but the surveyors that they employed had no such statement to guide them. They were not informed as to how they were to do their work, what land was to be included or what excluded, what degree of accuracy was required, or how corners were to be marked. With a few shining exceptions, most of the surveyors had no idea of the value of accuracy, and the instruments used were of all kinds from a ship's compass to an engineer's theodolite. No one was required to show his qualifications before being employed by the Commission as a surveyor, and absolutely no effort was made to test the accuracy of the work done. As a matter of fact, under the circumstances it would have been a physical impossibility to have done so. Only in rare instances were corners marked and adjoining surveys made to agree. In general each piece of land was surveyed independently, no stakes being placed. Consequently overlaps and laches were the rule rather than the exception. Add to this the erratic behavior of the magnetic needle here and the meager descriptions given, and you have some idea of the difficulties met in relocating the original boundaries of the awards and why a special sort of education is required in order to do land surveying in Hawaii.

In addition to technical training and experience, a good understanding of the Hawaiian language is necessary to the local surveyor, and also some knowledge of the individual peculiarities of the early surveyors and their work. One of

these, for instance, used a very defective compass and, while his distances are good, his bearings are utterly unreliable; another had a compass with the line of sight at an angle of a few degrees with its needle, so that his surveys have all to be swung through the same angle to fit the ground; another used a theodolite and measured the angle made by each line with the magnetic bearing of the first course; others, instead of writing out their descriptions in terms of the magnetic bearings at each corner, used the average magnetic north of all the corners, obtained by taking back sights at each corner.<sup>4</sup> These are only samples of the things surveyors here have to learn by experience. The magnetic needle here will often show a variation in direction of over a degree in a distance of a few hundred feet, and different compasses will sometimes show almost as great a variation between the readings.<sup>5</sup> This increases still more the difficulty of retracting the original surveys.

#### CHANGES IN MAGNETIC DECLINATION.

Another important item that has to be allowed for in rerunning old magnetic surveys is the progressive change in the direction of the magnetic north. From the time of the Land Commission to date (March, 1920) there has been a total change of approximately  $2^{\circ} 00'$ . This change has been in a clockwise direction. As a result,  $2^{\circ} 00'$  must be added to all northwest and southeast bearings of 1850, or thereabouts, in order to translate them into magnetic bearings of 1920, and similarly the same amount must be subtracted from all northeast and southwest bearings of 1850. The rate of change is subject to a progressive variation, which, though small, is not negligible. This change in the magnetic meridian at the present time is at the rate of nearly 2.25 minutes per annum.<sup>6</sup>

#### RELOCATION OF BOUNDARIES.

To go on the ground without any previous preparation and attempt to locate the corners of an award would be folly in most cases. The problem is not nearly so simple. First, the original description should be tested for closure. This will

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<sup>4</sup>See "Appendix A" to this article for list of early surveyors with comments.

<sup>5</sup>The local variations in the magnetic declination are discussed quite fully in "No. 11" of C. J. Lyons' articles in the "Islandor," to which anyone interested in the subject is referred.

<sup>6</sup>See "Appendix B" to this article for a more detailed statement as to the rate of change in the magnetic declination.

help in adjusting the sides if it does not fit the ground. A preliminary survey should then be made of the ground and all landmarks carefully located and plotted on paper, the magnetic declination being observed. It requires some experience and judgment to determine what landmarks are pertinent. Now with everything on paper in miniature, the surveyor can plot on his plan the original survey and shift and adjust it until he is satisfied that he has the best location. That is not all, however; he should also take into account the adjoining surveys and plot them too on the plan, remembering the rule that the earliest title governs, for, as I have said, adjoining descriptions were not usually made to fit. Having satisfied himself as to where the boundaries lie, it is not a difficult matter to run them out and mark them on the ground. This may seem like a long drawn out process, but it is the only safe and sure way to proceed and is invariably the quickest way to get satisfactory results. It is needless to say that the problem of overlaps and laches is one of the most difficult that the surveyor in Hawaii has to solve. Another difficult problem, which however, is not peculiar to Hawaii, is that of shifting natural boundaries, as streams and shoreline.

#### WORK OF HAWAIIAN GOVERNMENT SURVEY.

The awards issued by the Land Commission are recorded in ten huge volumes. There is a statement as to general location, a brief description by metes and bounds of each parcel, usually in Hawaiian, an outline plan showing the adjoining owners and nothing more, sometimes not even as much. Practically no general maps showing the relative positions of these parcels with respect to each other and the surrounding topography were in existence before the establishment of the Hawaiian Government Survey in 1872. The work that was done by this survey in the following years in the way of preparing such maps has been of incalculable value to the public. It is hard enough to locate a kuleana,--say in Waikiki,--with a general map of the district, but think what it would be without such a map! Another great service that the Government Survey has rendered, which the general public cannot appreciate, has been the introduction of a system of surveying by the true meridian instead of the magnetic and the establishment of carefully located and marked points from which the direction of the true meridian can be readily obtained. Still another service rendered by the Government Survey has been the raising of the standards of local surveyors and the improvement in their methods over what they were prior to 1872. It is fortunate for us that this valuable department has been kept

almost entirely free from political interference during the many changes in government that have taken place since it was started and has been able to maintain throughout this period the same high standard of work and service.

#### IMPROVEMENT IN STANDARDS OF SURVEYING.

A feature of land surveying in Hawaii that deserves mention and which people are not generally aware of, is the great improvement during the last twenty years in the quality of the work done by the local surveyors. Twenty years ago a survey closing within one foot in one thousand was considered quite accurate, even in town. What we might call "precise surveying" was not at all common. Now the situation is reversed and "precise surveying" is the rule instead of the exception.

Several factors have contributed to this result, the most potent of these being the influence of the Land Court. When the title of a piece of land is guaranteed for all time by the government, it is absolutely necessary that it be described in such a manner and with such accuracy that there can never be any question as to the location of its boundaries. Those who were responsible for the drafting of the Land Registration Court Act passed in 1903 and for its early administration appreciated this fact fully and saw that the character of the surveys filed was properly safeguarded. During the first few years of its existence the Land Court employed technical experts to check the accuracy of these surveys. Recent amendments to the act have placed this work under the Territorial Surveyor and require the testing of all surveys on the ground. Having been connected with the Land Court in an official capacity for several years, the writer has observed with considerable satisfaction the salutary effect its standards have had on the local surveyors.

Another factor in making the local surveyors improve the quality of their work is the act relating to the filing of plans passed in 1905, and amended a few years later so as to require all plans filed with the Registrar of Conveyances to be tested and approved by the Territorial Surveyor before acceptance. It seems almost incredible, but up to the passage of this act land in this city was bought and sold by lot and block number as shown on maps copied in the books of the Registry of Conveyances,--maps which do not give the length and bearing of a single line and which are of such

a scale and so imperfectly drawn that it is impossible to even approximate the true dimensions of the lots. Such a law was absolutely necessary for the protection of the public and should have been in force years ago.

A third and more recent step in advance has been the application, where the government is involved, of the same safeguards to the surveys filed with the Commissioners of Boundaries. Maps are also required to be filed with the Commissioners to be kept as permanent records similar to the maps accompanying Land Court Petitions. Anyone who has dug over the records of the Boundary Commissioners, which only contain notes of survey unilluminated by maps, will appreciate this change. The evolution in the methods of these Commissioners is worthy of note from the days when not even notes of survey were required and the boundaries of lands were adjudicated and settled by reference to natural features, to the present time when not only are maps and notes of survey required, but these are also carefully scrutinized for possible errors.

As has been shown, there has been real progress made during the last twenty years towards standardizing our land surveys, if not our land titles, and it is to be hoped that there will be no retrogression in the future.

#### APPENDIX A.

##### Surveyors for the Land Commission.

Alexander, W. P. - One of the most careful surveyors of that time.

Bailey, Edward - Work was fairly good; main fault was the correcting of errors of closure in the office without testing on the ground.

Baldwin, Dwight - Surveyed only one or two small pieces in Lahaina.

Bishop, Artemas - Had no conception of the value of accuracy or the desirability of making adjoining surveys agree, consequently his surveys are extremely inaccurate and inconsistent.

Dillon, James - Work was fairly good; used an engineer's theodolite and the magnetic north of the initial point a method which has the fault that a blunder in reading or recording the magnetic bearing of the first course may swing the whole survey through an angle of several degrees.

Dole, Daniel - Surveyed only a few small kuleanas in Waikiki.

Emerson, John S. - The accuracy of his work was impaired by the employment of an unreliable chainman, who, in staking out land sales, Joseph S. Emerson reports was in the habit of placing the pin in the ground beyond the end of the chain, thus giving more land than the calculated area called for.

Fuller, John - An extremely careful surveyor; both Joseph S. Emerson and E. D. Baldwin, who have had much experience in rerunning his surveys, say that he was the most accurate surveyor of his time.

Gower, John T. - A very careless surveyor.

Hopu, Aga - This surveyor evidently used a compass that was quite "off center," as his surveys have to be swung about 4° counterclockwise to fit the ground.

Kahema, Job - Work was poor.

Kalama, S. P. - One of the most reliable native surveyors of that time, with a very extensive knowledge of the names and boundaries of Hawaiian lands.

Kalanikahua, D. - As far as I can learn, not a very reliable surveyor.

Kaona, J. - Surveyed only a few small kuleanas near Honolulu.

Keohokalole, Abraham - Surveyed only a few small kuleanas in Wailuku, Maui; work was revised by Edward Bailey.

Kittredge, Chas. S. - A well trained surveyor; work was not as good as one would expect from his training.

Lyman, Fred. S. - A very careful surveyor.

Lyman, Henry M. - Like his brother, a very careful surveyor; said by C. J. Lyons to have used the average magnetic north in writing out his descriptions.

Lyons, Curtis J. - Perhaps the most careful and conscientious surveyor of that time; used the "average needle" in his descriptions.

Makalena, John W. - Work fairly good, except when he attempted to survey large tracts.

Meyer, R. W. - Said to have been educated in Germany as a civil engineer; a very careful and intelligent surveyor.

Metcalf, Theophilus - One of the good surveyors of that time; described by C. J. Lyons as "a very shrewd and practical man, whose surveys have the merit of always exhibiting and referring to natural features for fixing the lines run." His compass is said by the same authority to have read about 50' to the east of magnetic north, so that his surveys should be corrected this amount before being run out.

Nahale - Did some surveying in Wailuku, Maui; work revised by Edward Bailey.

Pease, W. H. - One of the most careless and unreliable surveyors of that time.

- Palham, John - Another very unreliable surveyor.
- Polanola, John - Only made a few surveys of small pieces; work said to have been fair.
- Richardson, George - Work said to have had the same fault as his brother John's (see below); they may have used the same compass.
- Richardson, John - Must have used a very defective compass; his distances are good, while his bearings in most cases are quite unreliable.
- Rowell, G. B. - Only did a limited amount of surveying at Waimea, Kauai.
- Thurston, Ann G. - Work was fair.
- Turner, A. F. - Said to have used an English theodolite, and, like James Dillon and Wm. Webster, to have written his notes out in terms of the magnetic north of the initial point. His surveys as a rule fit together and close well, but are not easy to rerun, many of them bearing strong evidence of having been "doctored."
- Ua, L. S. - Work was good for a native surveyor; like Kalama and Makalena, Ua had an intimate knowledge of Hawaiian lands and boundaries.
- Webster, William - Perhaps the best trained and qualified civil engineer in the islands at that time; a very careful surveyor, using a theodolite and the initial magnetic north.

Most, if not all, of the early native surveyors were trained at Lahainaluna School under W. P. Alexander. While not always reliable, they were never guilty in their kulcana surveys of such grossly inaccurate work as was done by some of the white men. They also had a great advantage over many of the white surveyors in their intimate acquaintance with Hawaiian land matters and the language.

#### APPENDIX B.

##### RATE OF CHANGE IN THE MAGNETIC DECLINATION IN HAWAII

The greatest difficulty in determining the rate of change in the magnetic declination in Hawaii has been, until recent years, the lack of magnetic observations free from instrumental errors. There is available a mass of readings of the magnetic needle at a great many different points on the islands covering intervals of from fifty to seventy years, but these have been made with different instruments and under such diverse conditions that they are almost valueless for purposes of comparison.

Mr. C. J. Lyons reports that in 1853 he "took, with great care, the bearings of a number of well defined mountain summits from a known locality on Hawaii (at Waimea), where no change in the needle would be caused by moving 40 or 50 feet in any direction. In 1872 the same bearings were observed with the same instrument, which at both times was in good order. The difference was 40', plus on northwesterly bearings and minus on northeasterly." This gives an average annual rate of a little less than 2', which was adopted and used for many years by the Hawaiian Government Survey. That this rate is too large has been the almost universal experience of local surveyors during the last twenty years.

In March and April, 1873, Prof. W. D. Alexander, Superintendent of the Hawaiian Government Survey, occupied a series of triangulation stations about Pearl Harbor. At most of these stations readings were taken of the magnetic needle. These give the magnetic declination, as determined by the instrument used, at a number of points in a region of coral formation remarkably free of lava rock and from magnetic disturbances of any kind. To get the change of magnetic declination since 1873, the writer, with the same instrument, in April of this year (1920), made careful measurements of the magnetic declination at, or near, six of the stations occupied by Prof. Alexander. The results, which were fairly concordant, gave a weighted mean of 1° 13' for the total increase in the magnetic declination since 1873, or an average of 1.55' per annum. This result combined with Mr. Lyons' gives a total increase from 1850 to 1920 of very nearly 2° 00', as follows:

1850 to 1853, at 2' per annum . . . . .	0° 06'
1853 to 1872 (C. J. Lyons) . . . . .	0 40
1872 to 1873, at 2' per annum . . . . .	0 02
1873 to 1920 (Alexander) . . . . .	1 13
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Total . . . . .	2° 01'

The first magnetic measurements free of instrumental errors were made at various points in the islands by E. D. Preston of the U. S. Coast and Geodetic Survey in 1892. Similar measurements at some of the same points were made by L. A. Bauer and E. R. Frisby in 1900 and S. A. Deol in 1906. Since 1902 a magnetic observatory has been maintained by the U. S. Coast Geodetic Survey at Sisal, Ewa, on the extensive coral flat lying between Ewa Plantation and Barber's Point.

From the magnetic measurements made by Mr. Preston in 1892 and Mr. Deel in 1906 the writer has compiled the following tables:

Station	Interval	Increase in Declination	Annual Rate
Cocoanut Island, Hilo. . .	1892.6-1906.3	27.0'	1.9'
Napoopoo, Hawaii . . . .	1892.6-1906.3	38.8	2.9
Waiimea, Hawaii . . . . .	1892.5-1906.3	21.8	1.6
Lahaina, Maui . . . . .	1892.6-1906.4	19.8	1.4
Kahuku, Oahu . . . . .	1891.9-1906.2	21.6	1.5
Waiimea, Kauai . . . . .	1892.7-1906.4	7.4	0.55
Honolulu, Oahu . . . . .	1892.4-1906.2	18.8	1.4

The abnormally large increase in declination in the rocky region of Napoopoo, Hawaii, and the abnormally small increase at Waiimea, Kauai, on a rocky bluff, indicate that the environment is not without influence upon the rate of change. Mr. Preston in his report expresses the fear "that local attraction might influence the work" at the Waiimea (Kauai) Station. The results from the measurements taken at these places in 1900 are not very concordant and have been omitted.

From the reports of the magnetic observatory at Sisal, Ewa, the following mean annual magnetic declinations and annual changes in declination have been compiled:

Year	Declination	Annual Change	Year	Declination	Annual Change
1902 . . .	9° 19.1'E.		1911 . .	9° 32.2'E.	0° 02.5'
1903 . . .	19.8	0° 00.7'	1912 . .	34.8	2.6
1904 . . .	20.9	1.1	1913 . .	37.3	2.5
1905 . . .	21.7	0.8	1914 . .	39.6	2.3
1906 . . .	23.0	1.3	1915 . .	41.6	2.0
1907 . . .	24.3	1.3	1916 . .	43.9	2.3
1908 . . .	25.7	1.4	1917 . .	46.3	2.4
1909 . . .	27.3	1.6	1918 . .	48.6	2.3
1910 . . .	29.7	2.4	1919 . .	50.8	2.2

These results show a steady increase in the annual change in declination up to 1912 and a decrease since then.

The work of the U. S. Coast and Geodetic Survey since 1892 has furnished a scientific basis for correcting magnetic surveys, which will become more and more valuable to local surveyors as time goes on and the results of the magnetic observations at Sisal accumulate.

**RULERS OF HAWAII: THEIR BIRTH, ACCESSION, LENGTH OF REIGN, Etc.**

(Compiled for the ANNUAL, from the best recognized authorities.)

Name.	Time and place of Birth.	Began to Reign.	Age on Acc'n.	Date and place of Death.	Age.	Length of Reign.
Kamehameha I...	Nov. — 1737, in Kohala...	—1782.....	45 yrs.	May 8, 1819, in Kailua.....	81 yrs. 6 mos.	37 yrs.
Kamehameha II...	1797, in Hilo.....	May 8, 1819.....	22 "	July 13, 1824, in London....	27 "	5 "
Kamehameha III.	Mar. 17, 1814, in Kailua...	Mar. 17, 1833	19 "	Dec. 15, 1854, in Honolulu..	40 "	21 "
Kamehameha IV.	Feb. 9, 1834, in Honolulu.	Dec. 15, 1854..	20 "	Nov. 30, 1863,	29 "	8 "
Kamehameha V...	Dec. 11, 1830,	Nov. 30, 1863..	33 "	Dec. 11, 1872,	42 "	11 1/2 "
Lunalilo .....	Jan. 31, 1835,	Jan. 9, 1873..	38 "	Feb. 3, 1874,	39 "	9 "
Kalaka'ua .....	Nov. 16, 1836,	Feb. 12, 1874	37 "	Jan. 20, 1891, San Francisco..	54 "	16 "
LIIHUOKALANI...	Sept. 2, 1838,	Jan. 29, 1891..	52 "			11 1/2 mos

\* Following a period of regency, from June 6, 1825, under Kaahumanu and Kalaimoku, during his minority.

‡ Elected by vote of Nobles and Representatives.

**KUHINA NUI OF THE KINGDOM.**

KAHUMANU, Kuhina Nui (or Premier), appointed by Kamehameha I., served under Kamehameha II. and III. till her decease June 5, 1832; succeeded by

KINAU, under Kamehameha III. till her decease April 4, 1839; succeeded by

KEKAULUOHU, under Kamehameha III. till her decease June 7, 1845; succeeded by

KEONI ANA, under Kamehameha III. and IV. till his decease July 18, 1857; succeeded by

VICTORIA KAMAMALU, under Kamehameha IV. and V. till the office was abrogated by the new Constitution promulgated Aug. 24, 1864.