

A PREHISTORIC FIELD SYSTEM IN CHIBCHA TERRITORY, COLOMBIA

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Aerial photographs of the 2600 meter high inter-Andean basin known as the Sabana de Bogotá (Colombia) frequently show traces of ancient features of various types, both natural and cultural. Old river-beds, horseshoe lakes, marshy zones and pantanos¹ are often clearly traceable, and there are many signs of former field boundaries and what appear to be old drainage ditches. The identification of these and other features has obvious importance for purposes of reconstructing past human activity and environmental characteristics that affected or were affected by such activity.

The aerial photographs of the Sabana that are readily available at the Instituto Geográfico "Agustín Codazzi" (Bogotá) are usually of excellent quality for the purposes for which they were taken; however, these purposes were not archaeological, and from this point of view they have some limitations. Having examined a number of them, I felt that they could be usefully supplemented by direct observation from the air and by photography under conditions more suited to my needs, especially in view of the well-known success of archaeological aerial reconnaissance in other parts of the world. Accordingly, in the summer of 1967 I undertook a series of survey flights over most portions of the Sabana and adjoining valleys. The most spectacular result of this survey, and the subject of the present report, was the discovery of an extensive pattern of cropmarks on the valley floor.

These cropmarks consist of small groups of short parallel lines; they form a checkerboard-like pattern in the middle of the valley floor, where individual groups of lines are aligned in roughly rectangular units. This pattern blends into a more irregular arrangement of variously-shaped units in the vicinity of what appear to be old stream channels and marshy areas (see figs. 1-4) Individual groups of lines often run at right angles to neighboring groups, and are frequently bounded by a single line of similar width and general appearance to the parallel lines, which sometimes appear to connect with the boundary line and sometimes definitely do not. In a few places, relatively clear-cut lines seem to be superimposed on a much fainter set running at right-angles to them. The lines appear to be about one to two meters wide, with about the same space between lines, and two to perhaps fifty meters long. Generally speaking, the lines appear dark on a lighter background: darker green in grass, corn, and other green crops, and green versus yellow in ripening wheat or barley. Naturally, a question might be raised as to which should be treated as background and which as pattern, but the dark lines appear to be more consistent in width and to run continuously for longer stretches than is true of the lighter areas.

Efforts to map the cropmark areas from aerial photographs and

by direct observation from the air showed that by far the clearest manifestations and largest continuous extensions of them were in the area of valley floor between the Suba and La Conejera hills and the río Bogotá, mainly in and around the vereda (rural district) La Conejera of the municipio of Suba, some 20 km. north of central Bogotá (see fig. 1)². The significance of this association will be discussed later. A few smaller patches of the checkerboard variant of the pattern were seen in other veredas of Suba, such as Tibabuyes and Centro, both south of the pantano limiting La Conejera, and also in Casablanca, on the other side of the hills, which form an isolated outcrop in the middle of the otherwise flat Sabana. Traces of the more irregular form have been observed beside or in old marshy areas and present pantanos (1) near the south end of Suba hill; (2) east of these, beside a tributary of the pantano El Lago; and (3) near Chocontá, about 60 km. to the north. This variant was also seen on the valley floor, without clear signs of old marshy zones, at the foot of the terraced hillside between Tocancipá and Sopo.³

On the ground, it is often very difficult to discern the pattern that is so clearly visible from the air. Where anything can be seen, it is a matter of variation in the growth of vegetation rather than surface relief; any differences of ground level are too slight to detect. In rough pasture grass, the impression at surface level is one of mere random variation in the height of grass tufts. However, at Guaymaral, the Aeroclub airfield, patterned differences of growth are perceptible. In the Kikuyu grass on and around the landing strip, differences in the density and height of growth give an illusion of parallel ridges, even when recently mown. On the grass runway itself, it is obvious that any but very slight differences of ground level would cause difficulties in take-off and landing, but cropmarks do in fact appear there. In the northwestern portion of Guaymaral there is an area of rather skimpy grass cover where the pattern is unusually well-marked; on the ground, one can clearly see strips of relatively dense, high growth alternating with strips of almost bare earth. The boundary between groups running at right-angles to each other shows up particularly well (see figs. 5, 6). It would appear that similar differences in height of growth are sometimes present in wheat; on circling over one wheat-field near Guaymaral, we found that cropmarks that were clearly visible from the side away from the sun could hardly be seen from the sun side, suggesting that shadowing brought out a patterned irregularity in the height of the stalks. The pattern often shows up well from the air in corn, and in this crop growth-differences are sometimes obvious at ground level, strips of corn a meter and a half alternating with others only a meter high, often more yellowish in color. By sighting along the edge of a cornfield, one can sometimes see a very definite series of "ridges" and "valleys" in the tops of the growth due to differences in height of the cornstalks (see fig. 7).

One other feature observed from the ground may be related to the cropmarks. Alongside the Bogotá-Suba road near the southern tip of Suba hill, a wide ditch with stepped walls had recently been dug,

presumably for a sewer line. In the face of the lower step of this ditch, I saw semicircles of black dirt, about a meter wide, half a meter deep, and half a meter apart, sharply demarcated against a yellow clay matrix. There were also at least two long intrusions of black dirt, of about the same depth as the semicircles (see figs. 8, 9). These marks gave the impression of a cross-section through a row of parallel, dirt-filled ditches dug into the underlying clay, adjacent to a long section through such a ditch at right angles to the first group. The horizontal surface above this face was thickly covered with disturbed dirt, a fact which made it impossible to follow the intrusions out in the brief available time. There was no sign of them in the face of the upper step, some three meters back from the lower one: here there was only a more or less uniform layer, about 50 cm. thick, of black dirt over yellow clay. On the opposite wall of the ditch, some five meters from the visible marks, there was only yellow clay, but portions of black dirt were to be seen on some standing remnants left in the middle of the ditch. According to large-scale maps examined at the Instituto Geográfico, there was a long, narrow depression where the ditch has been dug; inclination of subsurface strata showing in side-ditches suggests that the depression was ancient. Available aerial photographs show little sign of any surface markings in this locality, except for one taken in 1949. On this photograph, there seem to be some very faint, short, parallel lines approximately at right angles to the road, beside the start of the dogracing track then located there.

Whether or not they are related to each other, it seems obvious that both the black-dirt intrusions and the cropmarks are of artifactual origin, and that at least the latter represent some sort of ancient field system. One possible alternative, that they might be traces of old drainage ditches, is eliminated (1) by the fact that adjacent groups often run at right angles to each other, which makes no sense in terms of drainage patterns; (2) by their presence away from, as well as near to, apparent former marshy zones; and (3) by their distinguishability from other marks that probably do represent old drainage ditches. The checkerboard form of the cropmark pattern is visible in fairly large areas of the valley floor where elevations of 2560 m. or more are shown on Instituto Geográfico maps. This figure alone serves to dissociate these areas from present marshes and pantanos, which lie at about 2555 m. Because of the extreme flatness and wide extent of the Sabana floor, a five-meter difference in altitude there makes a big difference to drainage. Traces of former marshy areas lie at the same elevation as modern ones; they are often clearly recognizable on aerial photographs as rather sharply demarcated dark zones, of similar form to modern wet areas and located in places where water would obviously be present, such as alongside the river. In such places, especially near Funza and Fontibon, numerous more or less parallel lines are often visible, approximately at right angles to the river, which is where they usually end. Their position relative to the river and their confinement to old marshy zones makes it highly probable that these lines

do indeed result from old drainage ditches; they do not resemble the cropmark patterns under principal consideration here.

The altitude at which many of the cropmarks are found also indicates that these areas are not now particularly susceptible to flooding, since the river in this vicinity is at about 2548 m. It should be noted that, while considerable floods have occurred on the Sabana in recent years and are mentioned in colonial and 19th century literature, the area involved is seldom the Suba-Cota portion of the Sabana but the lower-lying region to the south, especially between modern Bogotá and Mosquera.⁴ In Colonial times floods in this locality caused much inconvenience -- and therefore much comment -- because the main route to Bogotá from the Magdalena ran through it. However, the remarks of irritated travellers do not necessarily indicate that the entire Sabana was flooded when they had to wade through mud to reach Bogotá.⁵

Assuming, then, that the cropmarks represent an old field system rather than drainage ditches, consideration must be given to its relative age. A pre-conquest date is suggested on the basis of three types of evidence. First, the cropmarks differ from fairly recent field lines, which can also be detected. On aerial photographs, the recent field lines show as single dark lines running straight across one or more present fields, connecting at both ends with existing boundaries and not continuing beyond them, or showing other fairly clear relationships to modern field patterns. Some now visible as cropmarks are of such recent origin that the actual divisions they represent can be seen on older aerial photographs. As property changes hands or land is put to different uses, field boundaries are often rearranged; a fence is removed to unite two adjacent fields, or a field is divided by putting a new fence across it, retaining as much as possible of existing boundaries rather than laying out a radically new pattern. In cases where cropmarks of similar form to identifiably recent field boundaries do not relate easily to the existing pattern, it seems reasonable to suppose that they represent Colonial-period fields. In any event, these single straight lines of some length are quite different from the pattern of groups of parallel lines.

Secondly, the form and size of the individual "plots" suggest Indian rather than Spanish agricultural methods. They would form fields of suitable size to work by hand, but many would be awkwardly small for plowing. The lines themselves are often too broad to represent plowfurrows; they often cover two or three modern rows of crops. Tiny fields in large numbers in no way suggest the vast estancias de pan coger or de ganado mayor of Spanish land-titles, the boundaries of which ran in straight lines for long distances.⁶ While it must not be assumed that all Colonial Spaniards were wealthy landowners or that all Spanish properties were large, it seems unlikely that those Spaniards who were wealthy would have long allowed such attractive valley bottom-land to remain divided up into small properties; it is exactly the sort of land of which the largest Colonial haciendas were largely composed. And owners of thousands of acres seldom work

their land in parcels of less than an acre, especially when the main uses to which they put their land are stock-raising and growing Old World cereals.

Thirdly, the known Colonial history of land use in the area where the largest continuous extensions of the cropmarks are found suggests that they were formed before the land fell into Spanish hands, and not by any activities recorded there in historic times. La Conejera derives its name from a colonial hacienda, the lands of which seem to have been more or less coterminous with the present vereda.⁷ The history of this hacienda, while it does not account for the nature of the cropmarks, may explain their preservation. At first called "El Chucho," it belonged to the Jesuits from the early 17th century to their expulsion in 1767. It was then bought by the Castro family, who held it for about a hundred years, during which time it acquired the name "La Conejera" from a smaller neighboring property that was added to it. It was sold to the Escobar family, who sold it again some twenty years later to the Solano family, who still own what remains of it. With regard to the cropmarks, the significant fact is that when the Castros had it, the land was largely covered with forest and dense brush, inhabited by virtually feral cattle and native deer.⁸ Patches of forest were still present up to very recent years,⁹ and the last of the Sabana deer survived there well into this century.¹⁰ It is noteworthy that some cropmarks are visible in areas now cleared but shown as wooded on 1946 maps, and where scattered trees are still present, which suggests that the phenomena giving rise to the cropmarks antedate the development of forest cover.¹¹

The inference is that, in the area where the cropmarks are best preserved, Colonial-period land use was a matter of virtually complete abandonment to wild native vegetation. The degree of forestation reported under the ownership of the Castros suggests that the Jesuits before them had allowed brush cover to develop unhampered. Such treatment of the land, of course, in no way explains the formation of the cropmarks, but might well have made it possible for them to persist. A somewhat similar situation existed in a hilly area near Trujillo (Valle), which I visited briefly in 1965; it is said to have been covered with dense, high forest when colonization started there some 50 years ago. Where the forest has been cleared for pasture, numerous cultural land-surface features are visible, such as hillside field-ridges, house platforms, and roads or trails, preserved under conditions of abandonment and natural reforestation like those suggested for La Conejera (see fig. 10).¹²

The degree to which the lands of La Conejera were abandoned seems to have been rather unusual for the Sabana, in other parts of which forestation is not reported and lands seem to have been under heavier use, at least for stock-raising. Near Funza, thousands of head of cattle and other livestock are documented for the early 17th century,¹³ and in the 18th century the same is true for haciendas in Suba other than La Conejera.¹⁴ Aerial survey in these areas, while not exhaustive, has so far produced little sign of the distinctive

cropmark pattern under discussion here. Perhaps colonial stock-raising (with some planting of crops, especially in this century) caused sufficient surface disturbance to obliterate features that survived under minimal-use conditions at La Conejera.

While it seems clear that the cropmarks must represent a pre-conquest field system, the exact nature and purpose of this system is not easy to deduce from the cropmarks themselves. All that is evident is that there is now some variation in the soil which affects the growth of vegetation. What this variation involves and what caused it are not yet known, but some reasonable possibilities can be suggested. As noted, where cropmark locations have been examined on the ground there is little or no inequality of surface level, but it is possible that the marks represent former ridges that have weathered down, calling to mind the hillside ridges in Valle mentioned above and reported elsewhere in Colombia.¹⁵ In this case, however, the ridges would lie on the flatland of the valley floor rather than running up and down the slopes. Eidt has suggested that the Chibcha used raised planting-beds on the valley floor; he cites no documentary evidence but refers to and illustrates similar features in use today.¹⁶ I was inclined to doubt a pre-conquest origin for these beds, on the grounds that the ones I saw were devoted exclusively to European garden vegetables such as lettuce and green onions. However, 16th century documentary evidence does in fact exist. Aguado says: "...el maíz no se siembra en la tierra arada de los bueyes en este Reino, sino en cierta manera de camellones altos que hacen a mano...."¹⁷ He clearly means that in Chibcha territory the usual method of planting corn was in raised planting-beds, and that up to 1581 ploughing had not supplanted this technique. Such beds could easily have been arranged in a pattern such as that of the cropmarks.

Besides referring to Aguado's statement, West cites one 19th century mention of old agricultural ridges in Chibcha territory: Restrepo's remark that "Aun se ven en algunas haciendas anchos camellones cruzados de surcos, que son restos de antiguos trabajos agrícolas de este pueblo laborioso (i.e., the Chibcha)."¹⁸ This is obviously a paraphrase of an earlier, more informative, and probably more trustworthy statement by Acosta: "Aun se ven terrenos inclutos hoy en la llanura de Bogotá, ó que solo sirven para crias de ganados, surcados por anchos camellones que son vestigios de antiguos cultivos de estos pueblos eminentemente agrícolas...."¹⁹ Restrepo's "anchos camellones cruzados de surcos" would indicate a furrowed surface on the ridges themselves, but Acosta refers to "terrenos...surcados por anchos camellones," which implies nothing of the kind. Restrepo does not specify the Sabana as where the ridges were to be seen; Acosta does. In view of the history of La Conejera, it is especially interesting that Acosta should remark on their presence in uncultivated land or land used only for stock-raising. In this connection, a somewhat cryptic statement by Humboldt is also of interest. After speaking of aboriginal agriculture and of the possibility that population might have been denser before the conquest than in the 19th century, he says: "J'observerai seulement que, lorsque je visitai

les mines de sel gemme de Zipaquira, on m'a montré, au nord du village indien de Suba, les indices certains d'une ancienne culture dans des terrains qui ne sont pas défrichés aujourd'hui."²⁰ The location sounds very much like La Conejera, for north from Suba the only route to Zipaquira is via the road passing through that vereda to Cota. Evidently, Humboldt saw something rather impressive there in 1801, and whatever it was, he mentally connected it with aboriginal agriculture and dense population. It seems very likely that Humboldt's "indices certains" were one and the same as Acosta's "camellones," and that in the early 19th century definite ridges were visible where there are now only cropmarks.

Although Humboldt, Acosta and Restrepo all related these remains to prequest agricultural activities, none says that such ridges were used on the Sabana in their own day. Modern peasant techniques of planting corn, potatoes, and other aboriginal crops normally make use of a simple ox-drawn plow unless the terrain is too steep, the parcels are too small, or families are too poor to have access to one, when short-handled hoes with broad steel blades are used. Even in the latter case, however, narrow ridges like those characteristic of plow agriculture are thrown up. Combined plantings of corn and other crops, usually leguminous, are common, but the arrangement is usually in a single row on a narrow ridge, not on broad raised beds with room for several rows of plants.²¹ West refers to "...a type of hoe, called chuzo or pala, with a triangular blade parallel to the handle..." as the tool used to construct agricultural ridges in Colombia.²² On the Sabana, the word pala is used, not in its standard Spanish sense of "shovel" (here called garlancha), but to refer to a tool that fits West's description. It is more like a small shovel than a hoe (azadón), but the triangular blade has a side down instead of a point and is more in line with the handle. It usually looks home-made, whereas the garlancha is a store-bought shovel of the type familiar to Americans. I have seen palas used for digging post-holes and cleaning ditches (they are excellent for trimming archaeological sidewalls), but not for preparing soil for planting.

Ridged and raised fields in various parts of South America have recently been discussed by Parsons and Denevan.²³ The cropmark patterns on the Sabana strongly resemble some, but not all, of their types of ridged-field patterns, most of which are found in tropical lowland floodplains. They are most like the ridged and ditched types reported from the Llanos de Mojos, Bolivia, which seem to be similar to the cropmarks in size as well as in pattern of arrangement.²⁴ A checkerboard type found in the Río San Jorge area, Colombia shows a pattern of arrangement in blocks of parallel ridges often at right angles to each other which is very much like that of the Sabana cropmarks, but the ridges are wider and farther apart, averaging about 20 feet wide and 45 feet crest to crest.²⁵ In both of these areas, Parsons and Denevan recognize other types of field patterns which seem to be commoner than those that resemble the cropmarks. Near Lake Titicaca, patterns like the cropmarks are present, but again the

ridges are broader and farther apart.²⁶ In the other reported localities (in Surinam and near the Guayaquil airport in Ecuador) the ridges or platforms appear to be much broader than the cropmark lines, and the pattern of arrangement is different.

Parsons and Denevan infer that the purpose of the lowland ridged and raised fields was to improve drainage and to keep the planting surface above water level in areas subject to flooding, particularly for tropical root-crops such as sweet manioc which require well drained soil.²⁷ Potatoes, which were a very important Chibcha crop, also require good drainage; they are now successfully grown on the Sabana floor, but hillside land is usually preferred. As noted previously, in the Suba region the checkerboard form of the cropmark pattern is found in areas that seem to be too elevated to be very wet, but the more irregular variant does occur on the borders of or actually in former marshy zones. Commenting on the Parsons and Denevan article, Deshler suggests that ridged fields in seasonal swamps in south central Tanzania "...serve to broaden the subsistence base of local cultivators because the swamps have a reliable supply of soil moisture over a longer period of the year..." than hillside land.²⁸ Such reasons seem to have made pantanos desirable property for colonial stock-raisers in the Sabana, and may likewise have influenced the Indians.²⁹ I have previously suggested that the vicinity of pantanos was a favored living site, giving another reason: that fishing in them, perhaps even fish farming, was an important food resource.³⁰ The suggestion of fish farming was based on a tantalizing documentary statement that in the nearby rivers and pantanos the Indians of Bogotá "...tienen fundadas sus pesquerias por çanjas y corrales...."³¹ Ditches and fences suggest a more positive approach to fish production than simple exploitative rights over recognized fishing-grounds; they also suggest something like the cropmark pattern. Parsons and Denevan mention a suggestion that some ridged fields could have been fish ponds.³² This suggestion perhaps should not be totally discounted in all cases.

One further possibility is suggested by the trench profile seen at the south end of Suba Hill. If it represents what lies under the cropmarks, it would explain the differential crop growth, since topsoil would be deeper in the ditches. In fact, the purpose of such features might be exactly to provide a greater depth of humus where crops were to be planted. Further examination of this possibility awaits an opportunity to trench across an area of cropmarks to examine the underlying profile, which I hope to accomplish in the near future. Additional investigation should include pollen analysis, testing for differences in pH and other factors that might influence crop growth, and further aerial reconnaissance and study of existing photographs. Infrared photography should also be tried, since it might bring out vegetation differences too subtle to detect with the naked eye.

Whatever the exact nature and purpose of these fields, their discovery supports my earlier contention that the Chibcha did indeed

make use of the valley floor, in spite of assertions that excessive water would have made it unsuitable.³³ It is possible that at least some of the cropmarks represent methods of making use of wet areas, and in any case they seem to provide evidence for intensive farming over a considerable extent of the Sabana floor in one of its flattest portions. Moreover, estimates of Chibcha population will eventually have to take them into account. On viewing these innumerable tiny fields from the air, one calls to mind immediately the chroniclers' words about numerous towns, extensive fields, and dense population. It takes little imagination to see them dotted with Indian farmers tending their crops, or to visualize communities of some size living in well-supplied comfort and supporting their leaders in style and dignity from the produce of such carefully prepared farmlands.

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NOTES

¹A characteristic feature of water distribution on the Sabana, usually bodies of almost stagnant water rather than mud, long, narrow and more or less dendritic in form, which drain into rivers and support a rich aquatic flora and fauna (Broadbent, 1966, p. 1).

²On this map, the direction of hachure lines approximates the orientation of the cropmarks. However, neither this nor the marked extent of the cropmark areas should be regarded as absolutely reliable, since the methods used are unlikely to produce great accuracy. Much of it was done by flying over the area at 1-2,000 feet above ground level and attempting to pencil in on a map what could be seen on the ground.

³Haury and Cubillos, 1953, p. 77; Broadbent, 1964.

⁴Rodríguez Freire [1636], 1963, p. 196, Capítulo XIII; Mollien, 1944, p. 60.

⁵Camacho Roldán, 1897, pp. 1, 20-21; Le Moyne, 1945, p. 111.

⁶E.g., Archivo Nacional de Colombia, Encomiendas, tomo 14, ff. 98r-v.

⁷Pardo Umaña, 1946, pp. 30,34.

⁸Pardo Umaña, 1946, pp. 32-33, 35.

⁹van der Hammen and González, 1963, pp. 211, 257.

¹⁰Pardo Umaña, 1946, p. 35.

¹¹Instituto Geográfico, Mapa General de Colombia, Plancha 228-I-C.

¹²Cf. West, 1959; Parsons and Denevan, 1967, p. 98.

¹³Broadbent, 1966, p. 7.

¹⁴Juan Villamarín, personal communication.

¹⁵West, 1959.

¹⁶Eidt, 1959, p. 386. Denevan (1966, p. 122) appears to have gathered that Eidt is referring to rows of circular mounds; my impression, based on conversation with Eidt, his published photographs, and observation of what I take to be phenomena of the type he mentions, is that he means long, narrow, low ridges.

¹⁷Aguado [1581], 1956-57, vol. I, p. 439, Parte 1a, Libro 4o, Capítulo 23o; cited by West, 1959, p. 280.

¹⁸West, 1959, p. 280; Restrepo, 1895, pp. 121-122.

¹⁹Acosta, 1848, p. 204.

²⁰Humboldt, 1816, vol. II, p. 223, Planche XLIV.

²¹Cf. Fals Borda, 1957, pp. 166-178; 1961, pp. 140-150; Smith, 1944, pp. 50-51.

²²West, 1959, p. 279.

²³Parsons and Denevan, 1967. See also Plafker, 1963; Denevan, 1963, 1966; Parsons and Bowen, 1966.

²⁴Denevan, 1963, p. 540; 1966, pp. 87-89; Parsons and Denevan, 1967, p. 93.

²⁵Parsons and Bowen, 1966, pp. 329, 333; Parsons and Denevan, 1967, p. 94.

²⁶Parsons and Denevan, 1967, p. 97; Parsons, personal communication.

²⁷Parsons and Denevan, 1967, p. 93. See also Parsons and Bowen, 1966, pp. 336-337; Denevan, 1966, pp. 90-94.

²⁸Deshler, 1967.

²⁹Archivo Nacional de Colombia, Caciques e Indios, tomo 20, ff. 83v, 98r.

³⁰Broadbent, 1966, p. 7.

³¹Archivo Nacional de Colombia, Caciques e Indios, tomo 55, f. 717v.

³²Parsons and Denevan, 1967, p. 98.

³³Broadbent, 1966, p. 7.

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KEY TO ILLUSTRATIONS

Plate XLI. Fig. 1. Location of cropmarks. Base: Instituto Geográfico "Agustín Codazzi," Mapa General de Colombia, 1:25,000 series, planchas 227-II-D, 227-IV-B, 228-I-C, 228-III-A.

Plate XLII. Fig. 2. Cropmarks east of Hacienda La Conejera buildings. Enlarged from vertical aerial photograph. Instituto Geográfico "Agustín Codazzi" no. C-525/858, Dec. 2, 1949.

Plate XLIII. Fig. 3. Cropmarks east of Hacienda La Conejera buildings. Oblique aerial photograph by Rudolf Schrimpff, August 1967. Fig. 4. Cropmarks at Guaymaral airfield. Oblique aerial photograph by Rudolf Schrimpff, September 1967.

Plate XLIV. Fig. 5. Cropmarks at Guaymaral airfield as seen from the ground. Fig. 6. Cropmarks at Guaymaral airfield (detail).

Plate XLV. Fig. 7. Variation in height of corn north of Cota. Fig. 8. Ditch profile, south end of Suba Hill.

Plate XLVI. Fig. 9. Ditch profile, south end of Suba Hill (detail). Length of iceaxe, one meter. Fig. 10. Hillside field-ridges and house platforms, Hacienda La Esmeralda, near Trujillo (Valle). Forest remnant on hill crest shows height and density of cover cleared for pasture.

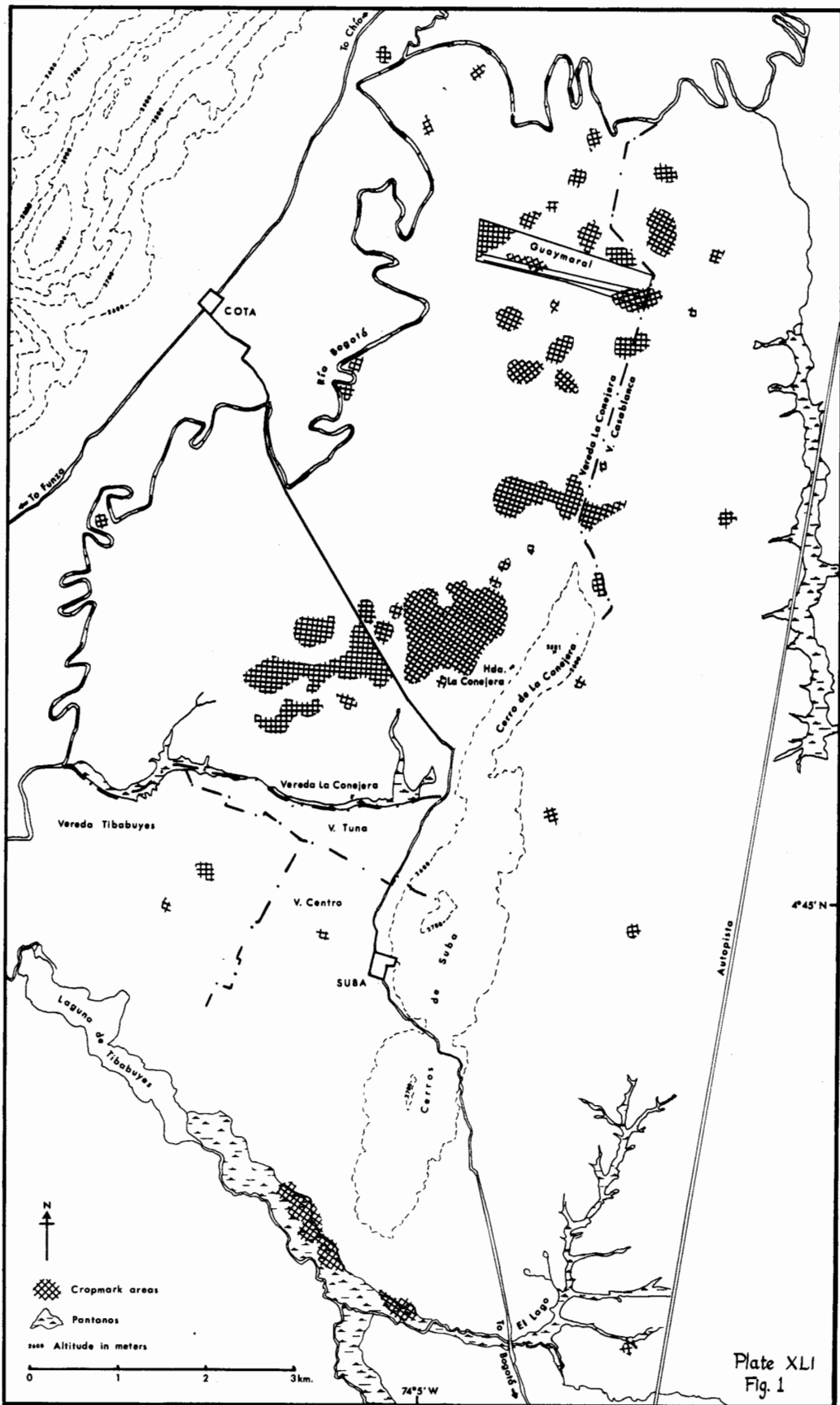


Plate XLI
Fig. 1

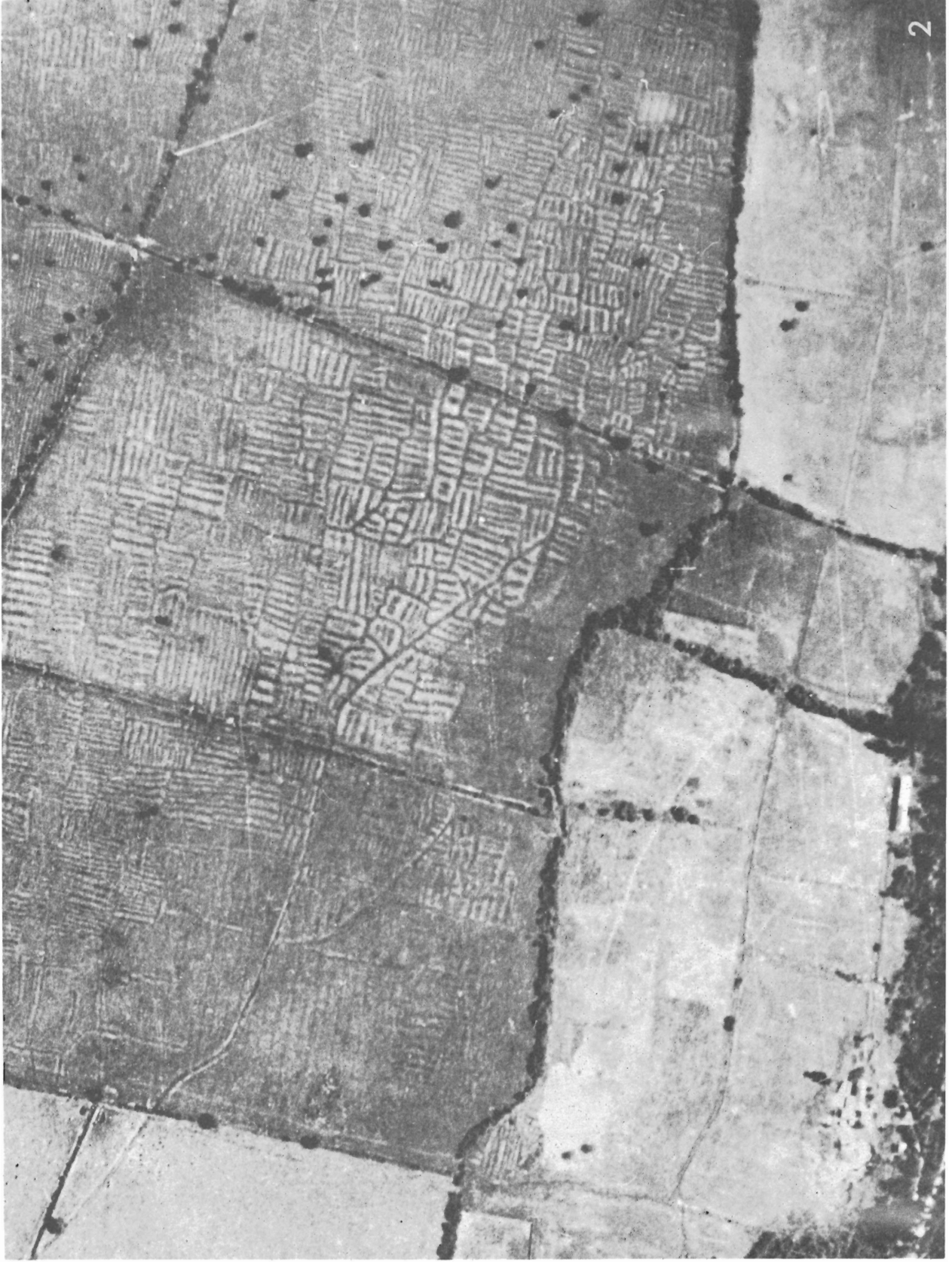
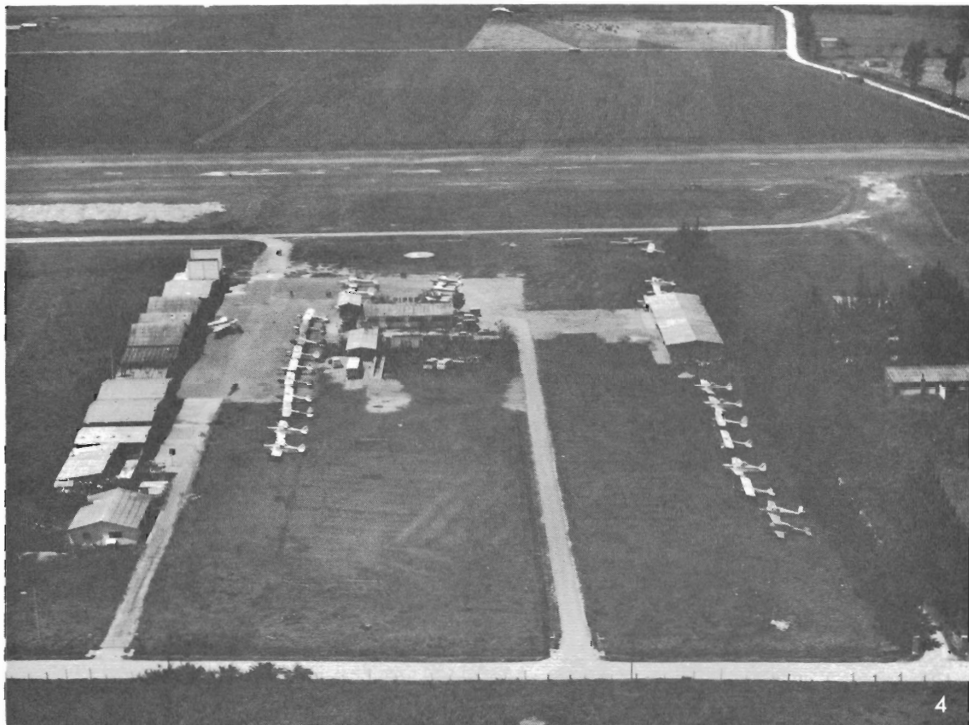


Plate XLII. Fig. 2. Cropmarks at La Conejera.



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Plate XLIII. Fig. 3. Cropmarks at La Conejera. Fig. 4. Cropmarks at Guaymaral.



Plate XLIV. Figs. 5, 6. Cropmarks at Guaymaral.

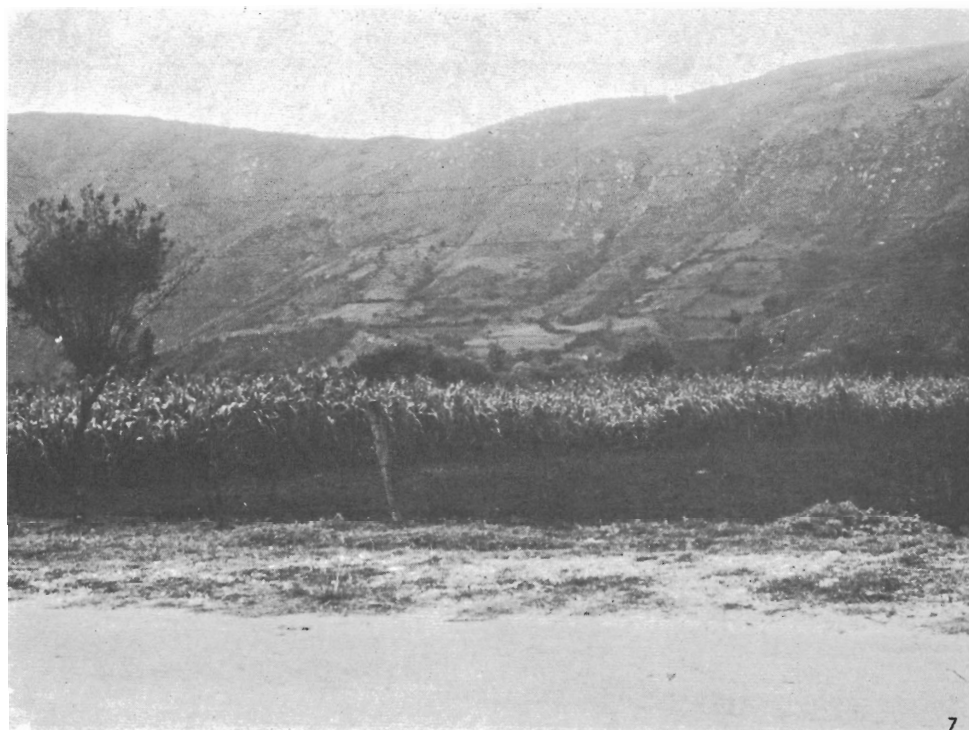


Plate XLV. Fig. 7. Variation in height of corn. Fig. 8. Ditch profile.



Plate XLVI. Fig. 9. Ditch profile (detail). Fig. 10. Hillside field-ridges (Valle).