marketed. This will in part offset live imports from Kenya and Tanzania, which were recorded at 15,000 head of cattle in 1964, and also the large imports of chilled and frozen meat. (Accurate assessment of the value of carcase and processed beef is not possible as customs figures do not differentiate between beef and other meats; and further, so-called "basket meat", that is under 10 pounds in weight, is not recorded as it crosses the border). Husbandry practices adopted by the farmers are to be carefully controlled to ensure that grazing is maintained within the carrying capacity of the area. Clause 5 of the Agreement signed by all ranchers states that the rancher promises "To stock, manure and manage the said land to methods prescribed or approved by the Commissioner of Veterinary Services and Animal Husbandry . . ."

A minimum of 200 cattle, of which at least 100 should be breeders, is expected on each ranch at the outset. This should ensure that pastures are grazed sufficiently to keep down regeneration of bush and provide a sound basis for future herds. The cattle will initially be Ankole longhorn or Zebu shorthorn, but at the Ruhengeri research station and the Mbarara Stock Farm experiments are being conducted with a view to cross breeding Aberdeen Angus and Redpoll with Boran, Ankole and Zebu. It is anticipated that upgrading of stock will be common, and this will increase the weight of beasts at slaughter and shorten the time taken to reach maturity. At present, the establishment of ranching is facing more immediate problems, for until the area is rendered safe from East Coast fever there is little point in upgrading the stock. Spraying twice weekly against the ticks which convey East Coast fever is therefore compulsory. Normal veterinary services will also be available for the treatment of other diseases such as Liverfluke, Rinderpest or Contagious Bovine Pleuro-pneumonia.

Certain other ecological problems also face the management of the ranches. To achieve a good profit of over £1,000 per year from each ranch, which is necessary if intelligent farmers are to be attracted, large ranches are needed. However, the pasture in its natural state is capable of carrying only one beast to every six or seven acres, in contrast to one beast to two acres in Teso. A pasture agronomist is investigating the problems underlying the means of improving the quality of the pasture. At the moment *Themeda triandra* is the main edible grass. This is rich when young but is of low nutritional value when mature. An inedible grass, *Cymbopogon afronardus*, is spreading and may, in limited areas, account for as much as 50 per cent of the pasture. As yet little is known about the conditions which favour the spread of this grass and whether it may be associated with burning or overgrazing. *Acacia hockii* also poses problems concerning the factors causing its spread, which in turn creates problems of control. Burning keeps the acacia low and thick so making penetration difficult for cattle. Only careful maintenance of the tsetse barrier to the south, however, would make the growth of tall bushes safe to the north of the clearing. Provided that these problems can be overcome and the various improvements established, it is possible that the land could carry up to one beast per three acres. The use of paddocks sown with particularly rich fodder, on to which animals could be put in rotation, might further improve the situation. For the time being, however, open grazing and kraaling in a boma at night, which has some of the characteristics of traditional pastoral practices, will be necessary; for in addition to the other problems lions and leopards are still a menace.

In an area such as east Ankole, which may be more suited environmentally to pastoralism than to cultivation and which has a growing market, a cattle ranching scheme has reasonably good prospects. The Ankole Ranching Scheme allows an opportunity for the individual, alone or cooperatively, to share in this potentially profitable market. The twenty-eight ranches of 1965 will increase by a further thirty in 1966. If the more traditional pastoralists grazing the tsetse-cleared area north of the present scheme are encouraged by what they see, further schemes may follow in the future. The region is strategically placed to serve the area of beef deficiency in Congo and Rwanda, as well as in Uganda, and a small freezing plant might well augment present marketing facilities. In this way, Ankole may again become renowned for its cattle as in the past.

K. PEACE

SOME FACTORS INFLUENCING THE PATTERN OF RURAL SETTLEMENT IN MARAGOLI, WESTERN KENYA

Maragoli is an area comprising two locations in the Kakamega District of western Kenya. It lies immediately north of the Equator, and most of the area is situated to the west of longitude 34°40' east. Outstanding amongst the topographical features of this area are the Maragoli Hills which rise to heights of 6,068 feet (Maragoli) and 6,043 feet (New Maragoli). The southern boundary of these hills is defined by the Maseno and Maragoli faults running eastwards from Rabuor Hill. The Vuhani river, which flows southwards towards Lake Victoria, has deeply incised the area between the two peaks. North of the hill area a peneplain, lying generally at 4,500 to 5,000 feet above sea level, tilts gently westwards. The area is underlain by sedimentary rocks of the Kavirondian system and by volcanic rocks of the older Nyanzian system. Major plutonic intrusions of post-Kavirondian age are also in evidence, especially in the hill area of the south. The soils derived from the volcanic rocks are fertile, except in the zones bordering the hills where sandy soils predominate. Annual rainfall in the area varies between 40 and 60 inches per annum, with a double maximum in the long rains (March — June) and the short rains (September — November). A striking feature of the area is the abundance of surface drainage; numerous rivers and streams, most of which are permanent, flow from the Nandi and Maragoli Hills westwards to form the Yala river which debouches into Lake Victoria. There are also numerous springs, some of them artificially developed.

This is the physical background of an area which supports one of the highest population densities in East Africa, and an attempt is made here to distinguish factors which help to explain the pattern of rural settlement. Such historical evidence as is available appears to show that the Maragoli people, a sub-tribe of the Abaluyia, migrated from somewhere in Uganda, probably from Busoga, during the eighteenth century. Taking a south-easterly route, they crossed the present Busia District, and reached South Nyanza after negotiating the Kavirondo Gulf. Here their southward progress was arrested by several factors, amongst which was the inhospitable environment of the *miombo* woodlands of northern Tanzania with tsetse infestation spreading its tentacles into the Lambwe valley. Other factors included the lack of adequate water supplies

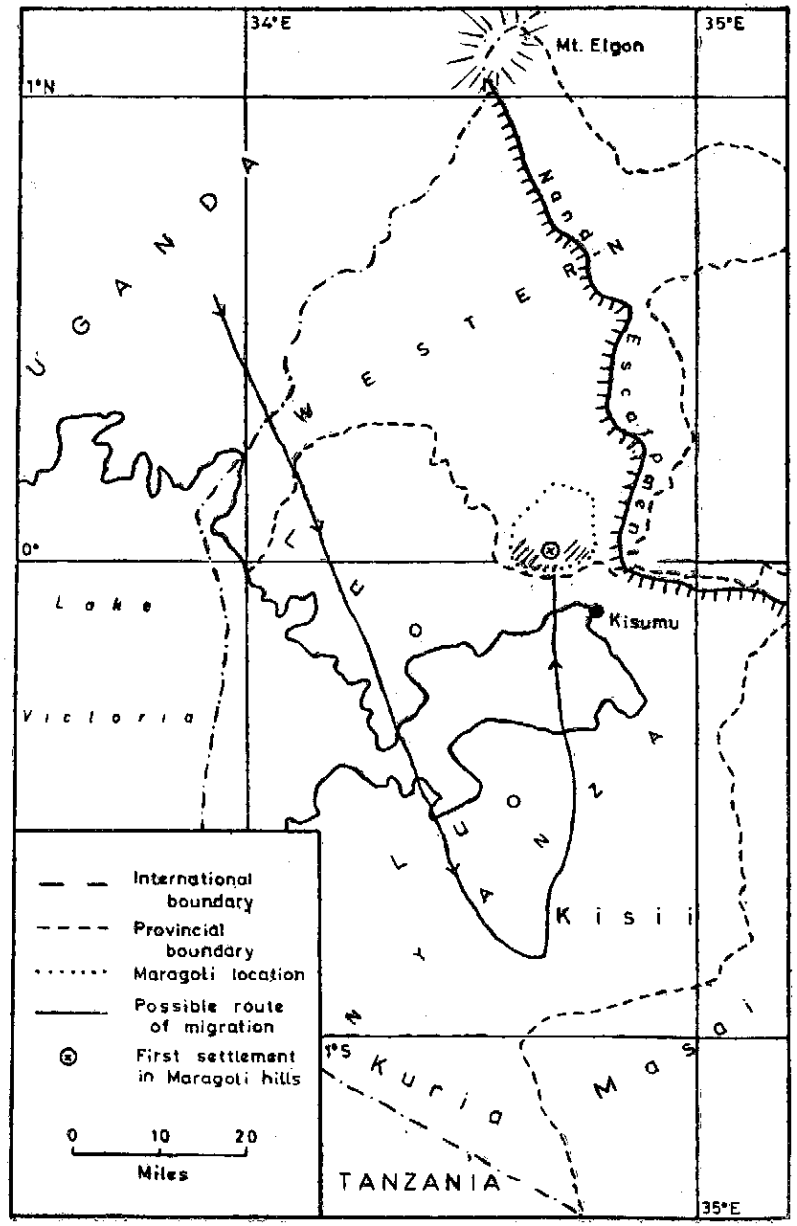

Figure 1.

and the hostility of the pastoral Masai and Kuria tribes. After a brief spell in South Nyanza, tradition relates that Mulogoli and his four sons re-crossed the gulf, leaving behind the Kisii with whom the Maragoli have linguistic affinities. Once on the northern shore the troubles of the Maragoli were not at an end; they were harassed by the Nilotic Luo, and took refuge in the Maragoli Hills. From their first permanent settlement, in the siting of which the defence factor seems to have been paramount, the Maragoli spread out over the hills and the peneplain to the north. For some time afterwards there was friction between the Maragoli and the Luo; this made Maragoli expansion to the south somewhat difficult, but the dry conditions of the area lying in the rain shadow of the hills rendered movement in this direction unattractive from another viewpoint. The Maragoli use of the term 'Chavavo', meaning 'of the Luo', suggests that the Luo were perhaps driven some miles to the south from an earlier tribal boundary to to the north of the Maragoli Hills. Expansion to the east was checked by the Nilo-Hamitic Nandi occupying the escarpment and the rift valley, so the only direction in which further migration and expansion could take place relatively easily was to the north and north-west over the peneplain.

The earlier type of settlement unit developed by the Maragoli was an enclosed homestead occupied by all the members of an 'extended' family. Security conditions demanded this form of nucleation, but by day people went out to work on their fields. In peace time and as population increased there followed a gradual dispersion of settlement which parallelled downward migration on to the plain. The Maragoli practise a mixed type of farming, and their first agricultural efforts in the area took the form of shifting cultivation; this method was soon abandoned, however, in view of rapid population growth and the lack of unoccupied ground to be broken. Individual, or rather family, land ownership soon became necessary, but since land was the only source of livelihood and security all the sons of a father usually inherited a plot. This process induced land fragmentation and encouraged a dispersal of settlement. A young man usually acquires a small plot of land when he marries, and builds his house upon it; if this happens in every case where there are eight sons in a family, each is left with no more than half an acre to cultivate. Efforts by government to halt this process have not been very successful; the success of land consolidation in the Central Province of Kenya cannot serve as a useful precedent because of the rather artificial conditions prevailing there during the Emergency of 1952-60.

In spite of these problems the degree of self-sufficiency in food production amongst the Maragoli people has been quite remarkable. The fertile volcanic soils and the adequate rainfall which is well-distributed and facilitates the cultivation of two crops a year, the mixed economy in which manure from the cattle *boma* replenishes the fertility of the arable plots, have all been instrumental in producing high yields per acre. These have in part been offset by poor methods of agriculture and overdependence upon grain crops which have depleted soil fertility. However, the main crops grown — maize, sorghum, wimbi (finger millet) and beans — are relatively easy to manage on smallholdings. Robusta coffee has been introduced during the past decade, but the local people have only recently begun to realize its benefits as a cash crop.

Although cultural factors have thus encouraged a dispersal of settlement amongst the Maragoli, the high population density nevertheless gives an

impression of nucleation in certain areas. Other factors, within the field of modern social and economic developments, have modified this pattern although no very fundamental change has been seen. The coming of road transport has tended to encourage settlement along the roads, or at least within easy reach of them; this is well-illustrated along the Kakamega-Kisumu road and in the vicinity of Maseno and Kaimosi. Markets and other trading centres, such as Mbale and Majengo, are also foci of population concentrations. The shift to these areas is very real but is not always easy to appreciate in such a densely populated area; a more sparsely populated region would show the change more noticeably. A reafforestation scheme on Maragoli Hill has also affected the pattern of population distribution. Until 1953 both Maragoli and New Maragoli Hills were fairly heavily settled, the latter rather more densely since the steep slopes of the upper parts of Maragoli Hill were unsuitable. Afforestation on Maragoli Hill involved movement to settlement schemes as far away as Kigumba in Bunyoro (Uganda) and Kanyamkago location in Kisii District. In spite of fire destruction in 1959 the afforestation schemes are proving successful and it is hoped in due course to supply a proposed paper mill at Broderick Falls. There is thus a great contrast between the two hills, the one forested and the other studded with thatched huts hardly distinguishable from the granite outcrops which locally restrict the cultivable land to a small fraction of the total area. These 'mountain-dwellers' have the great advantage of a healthy environment, for malaria is very rare.

At the 1962 census the two Maragoli locations had a total population of 99,368, or approximately one-sixth of the total population of Kakamega District which comprises eighteen locations. The average population density for the District as a whole is about 1,300 per square mile, but in the Maragoli locations this rises to over 2,000 per square mile. Travelling through Maragoli one is struck by the congestion of people and houses, and pressure on utilisable land is obviously severe. Whether the area is overpopulated is debatable, but famine periods are becoming increasingly regular between the months of March and June. Landless people are turning to abandoned and overgrazed slopes and to bulrush marshes for cultivation purposes, and these reclamation efforts, expensive in terms of time and energy, often yield only mediocre results. Migration to other areas has, perforce, provided another answer to the problem.

Maragoli thus provides an interesting case study in rural settlement, especially since it does not fit squarely into either of the main divisions of nucleation and dispersion. Factors leading to a given pattern of settlement in any area are complex and varied, and need to be taken carefully into account when attempts are made to solve problems which the geography of population presents.

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EAST AFRICAN TOPOGRAPHIC MAPPING

A. M. O'CONNOR

Introduction.

In the 1965 issue of the *Review* P.H. Temple provided an appraisal of the current state of geological mapping in East Africa. The present paper is intended to provide a similar survey of the current state of topographic mapping in Kenya, Tanzania and Uganda. It is not possible here to discuss the historical development of such mapping, and attention is confined to those maps currently available. The situation described is that prevailing in January 1966.

I Small-scale maps.

The only scale at which the whole of East Africa is shown on a single topographic sheet is 1:4 million. This sheet, published by the Survey of Kenya in 1963, combines the features shown on the Relief and Communications maps supplied with *The Natural Resources of East Africa,* (Nairobi, 1962), although it is neither very detailed nor very accurate (Entebbe is marked south of the Equator). The Survey of Kenya has also produced a map of Kenya and Uganda at 1:2 million the latest edition of which was published in 1961. This shows relief features particularly clearly, and also provides much more detail of settlements, but it does not show administrative boundaries. Tanganyika produced several editions of a 1:2 million map, and the latest appeared as the first edition for Tanzania in 1965. Towns, communications and administrative boundaries are clearly shown, as also is relief on the layer coloured version.

Uganda can be shown on a single sheet at 1:1 million, and a map at this scale has been available for many years. It was replaced in 1963 by an entirely new map, conforming to the specifications of the World 1:1 million series, which is generally regarded as being cartographically successful. Layer colouring gives a clear general picture of relief, while other topographic information is provided in great detail. Kenya is covered at 1:1 million in two sheets, separated by the Equator, both published in 1961. The two sheets together portray very clearly some major elements of the geography of Kenya. They employ layer tints in addition to contours at 2,000 feet vertical interval, and include information on vegetation as well as towns and communications. In respect of administrative boundaries, however, they urgently need revision, although separate maps at the same scale were produced in 1964 to show the new boundaries. Tanzania was covered by six sheets of the GSGS 1:1 million series published during World War II. The Dar es Salaam, Tabora and Lindi sheets were replaced in 1964 by new sheets in the World series, but as yet there is no recent map at this scale covering the Lake Victoria and southern highland areas. (The north-east is covered by the Kenya south sheet). The new sheets are extremely well produced, although no single sheet has as much to offer the geographer as the Kenya or Uganda sheets.

Only in Uganda have maps recently been published at 1:500,000; four sheets which together cover the country were produced in 1963. These show no more