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A general description of the Lambwe Valley area of South Nyanza District, Kenya

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The Lambwe Valley is located in the Nyanza District of western Kenya, approximately within the limits latitudes 0° 30′ and 0° 45′ south and longitudes 34° 10′ and 34° 20′ east (Fig. 1).

GEOMORPHOLOGY

The geomorphology of the Lambwe area can be summarized as follows (D'Hoore, 1964; McCall, 1958; Survey of Kenya, 1962). During the volcanic upheavals of the early Miocene period, major faulting occurred throughout much of eastern Africa. The Lambwe Valley is a south-westerly extension of the Kavirondo fault trough lying between the Kaniamwia Escarpment to the east and the Gwasi massif to the west (Fig. 2). The steep boulder-strewn escarpment is the eastern fault line scarp of the Kavirondo trough and it rises 450 m above the valley floor to an altitude of 1 722 m. Its dip slope declines gently in a south-easterly direction to the Kuja River system.

The Gwasi massif, which forms the western valley wall, is a dormant volcano; Usengere, the highest peak, rises to 2 270 m. Lesser peaks include Gwasi (1 945 m), Sumba (1 838 m), and Gembe (1 898 m). The Roo Valley gives access between the Gwasi and Gembe Hills to the coastal plains of Kaksingiri Bay.

The floor of the Lambwe Valley slopes gently from an altitude of 1 280 m to 1 190 m at the shore of the Kavirondo Gulf. In its broad northern end it contains the North and South Ruri hills, which rise to 1 615 m and 1 700 m, respectively. These carbonatite complexes are surrounded by conical volcanic plugs of hard lava known locally as *gots*.

Subsequent to its tectonic origin, the Kavirondo inter-fault zone subsided below the waters of Lake Victoria but emerged later when the lake receded. The deep porous lacustrine deposits then covering the floor of the Lambwe Valley have since been obscured by black clays, particularly by the characteristically impervious " black cotton " soil.

The Gwasi Hills and the Kaniamwia Escarpment support largely ferruginous tropical soils and halomorphic soils on rocks rich in ferromagnesium minerals (D'Hoore, 1964). On the escarpment and in the Gwasi foothills, mixed soil formations of red-brown friable clays, grey mottled clays (" Vlei soils "), and grey compacted loamy sands predominate. Levels of exchangeable sodium, magnesium, and calcium are high in these formations, and consequently valley floor soils have a high mineral content and are strongly alkaline. The higher parts of the Gwasi and Gembe hills support shallow stony soils and dark-brown clay loams with numerous rock outcroppings, particularly where the underlying stratum is of lava (*Atlas of Kenya*, 1962).

The South Ruri Hills, with their cores of calcite, support largely shallow stony soils with a relatively high thorium content. Formations to the east of the escarpment are composed largely of red and red-brown friable clays and shallow stony soils (D'Hoore, 1964).

DRAINAGE

The dip slope of the escarpment forms the main catchment area of South Nyanza, being drained by the many permanent and semipermanent tributaries that constitute the Kuja River system. To the west of the escarpment, the only permanent watercourse is the Olando River, which drains the eastern Ogongo Valley between the Ruri Hills and the escarpment.

Drainage in the Lambwe Valley is largely subterranean and the Olambwe River, which meanders the whole length of the valley, carries water only seasonally. Deep gullied watercourses in the Gwasi and Gembe hills and on the escarpment carry storm torrents after heavy rain, but this water is rapidly absorbed and does not reach the Olambwe River.

Beneath the valley floor the water table is continu-

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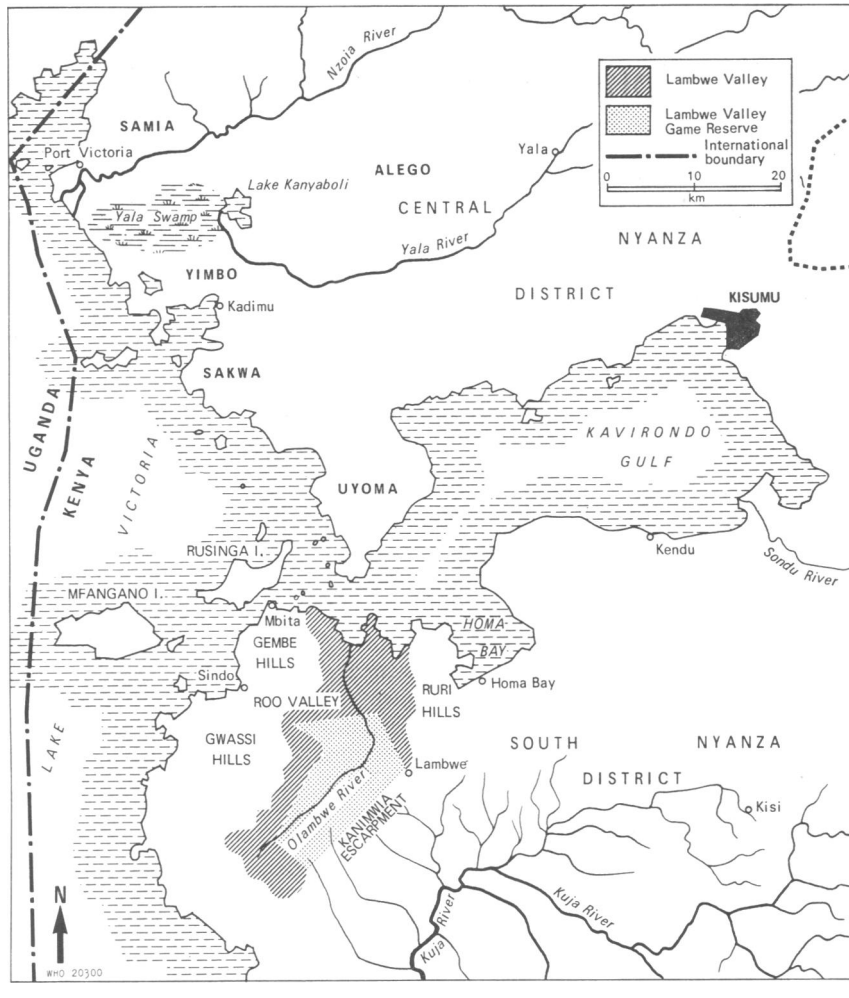

Fig. 1. The Lambwe Valley area, Nyanza District, Kenya.

ous with, but slopes away from, the surface of Lake Victoria (McCall, 1958). Where the water table approaches the surface of the flood plain there is a tendency to waterlogging, and this condition together with the occurrence of impervious soils results in extensive flooding during periods of heavy rainfall.

CLIMATE

The Lambwe Valley, which lies close to the Equator, tends to be hot and relatively humid. However, extremes of temperature and humidity are seldom experienced, on account of the altitude and the occurrence of shore breezes from Lake Victoria. Rainfall follows a typical bimodal seasonal pattern with peaks in March–May and October–December. Along the shore of the lake, particularly towards the south-west, there is a single wet season that lasts from March to May.

The centre of the Lambwe Valley and the area to the east of the escarpment receive the greatest amount of rain, the mean annual rainfall being approximately 1 270–1 525 mm, while the Gembe Hills and the western Gwasi Hills receive the least (approximately 760–1 020 mm annual mean). Other localities have a mean annual rainfall of 1 020–1 270 mm (*Atlas of Kenya*, 1962) (Fig. 3). Prolonged dry periods are not unusual throughout the whole area.

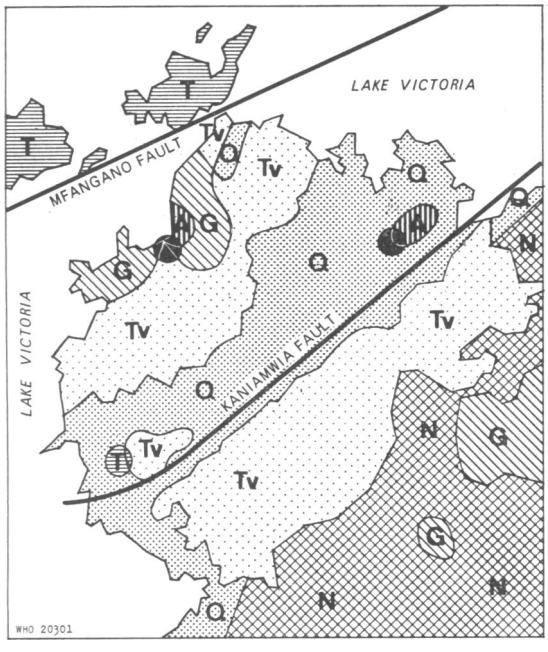

Fig. 2. The geological structure of the Lambwe Valley area. ● = Tertiary carbonatite centres; **A** = alkaline intrusive rocks; **G** = granites; **N** = Nyanzian (precambrian) complex; **Q** = quaternary sediments; **T** = tertiary sediments; **Tv** = tertiary volcanic rocks.

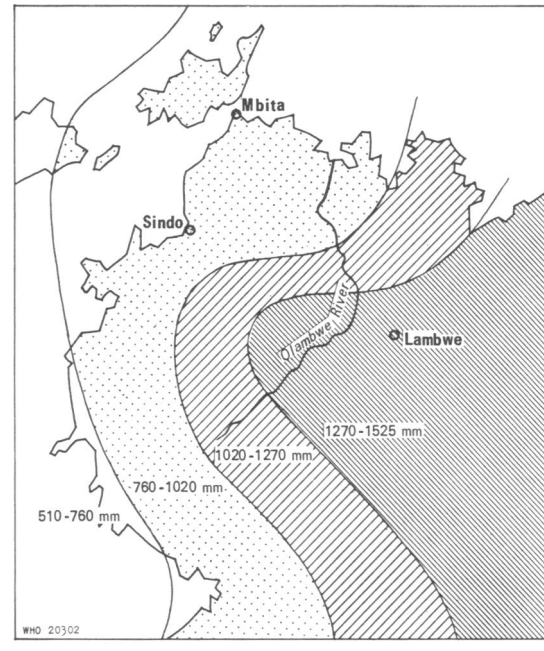

Fig. 3. Mean annual rainfall in the Lambwe Valley area.

VEGETATION

The vegetation of the Lambwe Valley is of the type described by Keay (1959) as " Tropical woodlands, savannahs—undifferentiated, relatively moist types ". In the area as a whole, 3 fairly distinct types of vegetation can be recognized; they are as follows:

(1) climax vegetation communities in areas not inhabited or influenced by man; found only on the crest of the Gwasi Hills;

(2) demographically determined subclimax communities slightly modified (directly and indirectly) by man; found mainly in the flood plain;

(3) demographically determined subclimax communities extensively modified by man; found on the middle and lower slopes of the main highland ranges.

Altogether, 8 plant communities are found in the Lambwe area. They are described individually below and their distribution in the central and upper Lambwe Valley is shown in Fig. 4.

Montane forest

This is climax forest restricted to the summit of the Gwasi Hills. It is dominated by *Euphorbia candelabrum* trees, which often attain a height of more than 10 m and tend to form dense continuous canopies that suppress undergrowth.

Hyparrhenia/Combretum grassland association

This is bushland formed by *Combretum* spp. in which the dominant grass is *Hyparrhenia fillipendula*. It is common on the stony clay soils of the upper slopes of the Gwasi and Gembe hills and the Kaniamwia Escarpment.

Hyparrhenia/Balanites grassland association

This is a tree savanna community in which the dominant associates are *Hyparrhenia fillipendula* and the tree *Balanites aegypticum*. It is restricted to the well-drained lower slopes of the highland masses. In some places the grass *Themeda triandra* is subdominant.

Setaria/Acacia and Themeda/Acacia grassland associations

These are tree savanna communities in which the dominant grass is either *Setaria spacelata* or *Themeda*

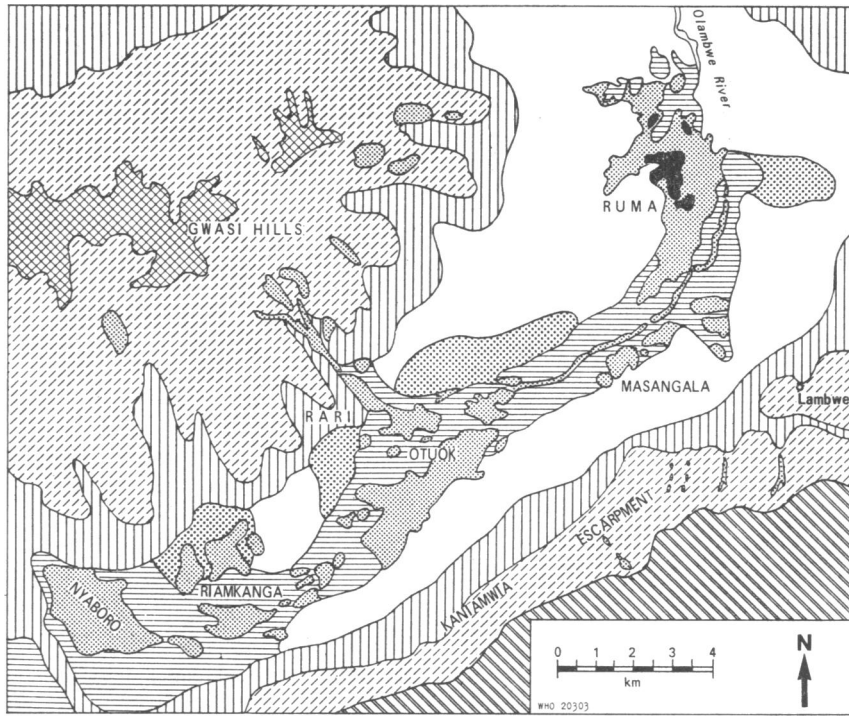

Fig. 4. Distribution of plant communities in the middle and upper Lambwe Valley.

Montane forest

Hyparrhenia/Combretum grassland association

Hyparrhenia/Balanites grassland association

Setaria/Acacia and *Themeda/Acacia* grassland associations

Setaria/Acacia and *Themeda/Acacia* grassland associations with dense *Acacia drepanolobium*

Isolated thicket clumps and *Acacia seyal* woodland

Dense continuous thicket

Euphorbia candelabrum consociation

Largely cultivated

triandra and the dominant tree is *Acacia drepanolobium*. Occasional *A. seyal fistula* trees also occur in these grasslands on peripheral, poorly drained, black clay soils of the Olambwe River flood plains.

Acacia woodland

This is a savanna woodland community dominated by fairly dense stands of *A. drepanolobium* or *A. seyal fistula* or both species on alkaline black clay soils. Areas along the Olambwe River subject to seasonal flooding are characterized by *A. seyal fistula*, often in association with *A. siberiana*.

Dense continuous thicket

This thicket community is dominated by the trees *Rhus natalensis*, *Grewia similis*, and *Euphorbia candelabrum;* the subdominants include *Cassine aethiopica*, *Euclea divinorum*, *Acacia pennata*, *Allophyllus alnifolium*, and *Mystroxylon aethiopicum*. Common shrubs include *Scutia myrtina*, *Maytenus senegalensis*, and *Scolopia* spp., while the herb stratum is often dominated by *Sansivaria* and *Aloe* spp.

Continuous thickets characteristically have clearly defined margins and closed canopies at a fairly uniform height of 5–7 m. There are 3 types of thicket, as follows.

(1) Floodplain (or lowland) thicket occurs in its most typical form adjacent to the Olambwe River on poorly drained and highly alkaline black clay soils. Local names for the largest thickets are Ruma, Otuok, and Nyaboro, and for groups of smaller thickets, Masangala, Rari, and Riamkanga.

(2) Hill thicket is found on the upper steep slopes of the Gwasi massif and the escarpment; it is associated with well-drained soils.

(3) Gully thicket consists of narrow strips of continuous thicket fringing ravines and eroded drainage lines that carry storm torrents down the numerous small valleys of the Gwasi massif and the escarpment. Where the vegetation is not too dense the lower tree stratum often contains plantations of banana trees and the ground is used for vegetable gardens.

Isolated thicket clumps

Isolated thicket clumps are invariably floristically identical with dense continuous thicket. They are located in grassland or woodland peripheral to the main continuous thickets on poorly drained soils.

Euphorbia candelabrum consociation

Discrete pockets of *Euphorbia candelabrum* have a restricted distribution throughout the main blocks of continuous thicket. Within this consociation understorey vegetation is suppressed by the dense interlocking canopy of *E. candelabrum*.

LARGE MAMMALS

Approximately 120 km² of the Lambwe Valley have been set aside as an animal sanctuary, the Lambwe Valley Game Reserve, mainly for the purpose of protecting two endangered species—namely, the roan antelope (*Hippotragus equinus*) and Jackson's hartebeest (*Alcelaphus bucephalus jacksonii*).

The present-day large-mammal fauna of the area differs from that 30–40 years ago in that species such as the elephant (*Loxodonta africana*), rhinoceros (*Deceros bicornis*), and lion (*Panthera leo*) are no longer found, having been either destroyed during early tsetse control operations or harassed to the point where they left the area permanently.

Although the larger species traditionally migrated between the Lambwe Valley and the Masai-Mara plains (i.e., the northern extremity of the Serengeti Plains), this migration does not now occur, presumably because extensive areas of human settlement separate the two sanctuaries.

The main species of large mammal in the Lambwe Valley at present are shown in the following tabulation.

bushbuck (*Tragelaphus scriptus* Pallas)
buffalo (*Syncerus caffer* Sparrman)
bushpig (*Potamochoerus porcus* L.)
bohor reedbuck (*Redunca redunca* Pallas)
defassa waterbuck (*Kobus defassa* Rüppell)
grey duiker (*Sylvicapra grimmia* L.)
hyaena (*Crocuta crocuta* Erxleben)
impala (*Aepyceros melampus* Lichtenstein)
Jackson's hartebeest (*Alcelaphus bucelaphus jacksonii* Thomas)
leopard (*Panthera pardus* L.)
oribi (*Ourebia ourebia* Zimmerman)
roan antelope (*Hippotragus equinus* Desmarest)
topi (*Damaliscus korrigum* Ogilby)

Several species of small mammal were also observed, but less frequently.

TSETSE AND TRYPANOSOMES

Three species of tsetse fly occur in the Lambwe Valley area. They are: *Glossina pallidipes* Austen, *G. fuscipes fuscipes* Newstead, and *G. brevipalpis* Newstead.

G. pallidipes is widely distributed, in moderate to high density, in blocks of continuous thicket and in areas of dense isolated thicket clumps. Scattered, low-density populations occupy gully and hill thickets up to an altitude of 1 525 m. Under favourable climatic conditions, *G. pallidipes* is able to spread over considerable distances through scattered thicket clumps, in woodland, and even in open country.

G. fuscipes was formerly well established in thickets along the Lake Victoria shoreline, in the lower Lambwe Valley, and on some of the islands in Lake Victoria adjacent to the mainland. As a result of control operations carried out by the Tsetse Survey and Control Division of the Government of Kenya in the 1950s and 1960s, tsetse has been eradicated or controlled in a number of localities, including the lower Lambwe Valley. Small, restricted populations of *G. brevipalpis* inhabit some of the main continuous thickets, particularly where *Euphorbia candelabrum* consociations occur, e.g., in Ruma thicket.

The species of trypanosome found in the area include *Trypanosoma brucei* Plimmer & Bradford, *T. congolense* Broden, *T. vivax* Ziemann, and *T. rhodesiense* Stephens & Fantham. In former times *T. gambiense* Dutton was prevalent in areas along the lake shore (Glover et al., 1958), but now appears to be absent.

HUMAN AND LIVESTOCK POPULATIONS

Like most of Nyanza Province, the Lambwe Valley area is populated mainly by peoples of the Luo tribal

group. Although these people were originally Nilotic pastoralists, they have become adapted to subsistence farming and fishing after settling around the Kavirondo Gulf some 350 years ago (Adamson, 1967). A relic of their pastoral origin is perhaps to be seen in the practice of keeping cattle for reasons of status and as convertible assets used mainly for the purchase of brides. These cattle are seldom slaughtered to supplement the low-protein diet of their owners, but are kept under the mistaken impression that a large number of animals ensures against drought, famine, and disease (Webster & Wilson, 1966).

Minority tribes represented in the area include tribal subdivisions of the Luyia group (Bantus from central and western Nyanza), Kipsigis (from Kericho District), Kisii (from Kisii District), and, around Kaksingiri, Suba of Ugandan origin.

The main areas of human settlement are located in plains along the lake shore, in the lower Lambwe Valley, in the eastern Gwasi–Gembe foothills, and above the Kaniamwia Escarpment. Although there are a few sizeable villages in the area, e.g., Mbita, Wiga, Magunga, most of the human population lives in small, dispersed, family settlements.

Livestock kept by farmers throughout the area include chest-humped zebu cattle (Faulkner & Epstein, 1957), sheep, and goats. Although cattle are seldom slaughtered for food, the human population benefits from the limited amount of milk they produce and many farmers employ oxen as draught animals (mainly for ploughing). At night, cattle owned by individual farmers are housed in small, crudely made *kraals* at the homesteads. Sheep and goats are allowed free range in most places but are usually confined at night.

Crop-growing is more a traditional occupation than an industry in most parts of the area. Although limited amounts of cotton and sugarcane are grown as cash crops in areas where edaphic and climatic conditions are suitable, most of the farmland is devoted to the cultivation of maize. Banana trees are common in some places, particularly in low-lying areas and in gully thickets.

The main occupations of people living in the lake-

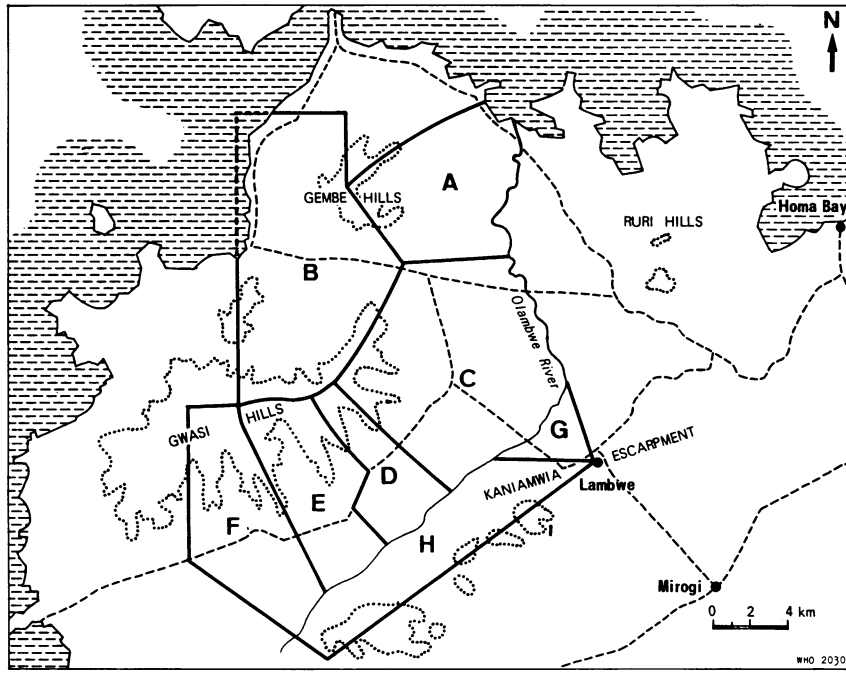

Fig. 5. Survey areas in the Lambwe Valley area. **A** = Obaluanda; **B** = Kaksingiri; **C** = western Ruma; **D** = Otuok; **E** = Wiga; **F** = Magunga; **G** = Masangala; **H** = Escarpment. Dotted lines are 5 000-foot (1 524-m) contours; broken lines are roads and tracks.

shore areas are farming, stock-keeping, fishing, and basket-making, the latter activity being limited to areas containing papyrus swamps. Inland from the lake, the main occupations are farming, stock-keeping, charcoal production, and illegal hunting.

SURVEY AREAS

In order to facilitate the activities of the various medical, veterinary, and entomological field survey teams working in the Lambwe Valley, the area was divided into 8 manageable survey areas as shown in Fig. 5.

RÉSUMÉ

DESCRIPTION GÉNÉRALE DE LA RÉGION DE LA VALLÉE DE LA LAMBWE DANS LE DISTRICT DU NYANZA DU SUD (KENYA)

Les auteurs présentent une description d'ensemble de la vallée de la Lambwe où se sont déroulées les recherches qui font l'objet d'une série d'articles dans le présent volume. Les principaux aspects évoqués sont: la géomorphologie, l'hydrographie, le climat, la végétation et la faune. Un chapitre est consacré aux diverses espéces de glossines et aux trypanosomes identifiés dans la région; un autre, aux populations humaines et à leurs ressources.

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