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ENVIRONMENTAL CHANGE OR STABILITY, WITH SPECIAL EMPHASIS
ON THE ROMAN AGRICULTURAL DEVELOPMENT OF LIBYA AND ITS
IMPACT ON LIBYAN ROMAN ECONOMY, PRIOR TO THE ARAB CONQUEST

by

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Introduction

During the Roman and Byzantine period, from the 1st to the 7th century A.D., Libya had its own intense agricultural activity, an aspect of its civilization that has escaped the attention of scholars until recent years. Even though European travellers (Pancho, 1928, p. 236) and Arabs (El Hachaichi, 1912, p. 60) noted that there were substantial archaeological vestiges, the opinions expressed about the agricultural significance of Libya were based on preconceptions that tended either to exaggerate the importance of the country or, on the contrary, to minimize it in the context of the colonial period (de Martino, 1912, p. 145). Moreover attention was directed to the coastland rather than the vast hinterland.

Thus there is a need to set the record straight. We shall first consider the geographic and demographic situation, exploring the forms of land development and types of agricultural activity with a view to ascertaining the main lines of historical development.

1. Geography and population

1.1 Regional differentiation

1.1.0 - First of all it is well to remember that Libya covers an area of some 1,760,000 square kilometres and that its Mediterranean seaboard is 1,900 kilometres long. Since it is largely composed of plains, plateaux and valleys, communication is generally easy despite the great distances involved.

1.1.1 - What distinguished the coastal zone from the interior is not so much the difference in relief but the difference in rainfall. An average annual rainfall of 200 mm is the minimum required for the dry farming of cereal crops and olive trees, i.e. without recourse to irrigation. In Tripolitania, the 200 mm isohyet takes in the Gefara and the rim of the Jabal, with the exception of a dryer sector situated at the foot of the Jabal West of Aziziyah. In the east of the country, the 200 mm isohyet includes an area situated north-west of a line running from Quaminis to Ra's-at Tin. To the south of that line, deterioration is extremely rapid: at a distance of 80 kilometres below that line, the 25 mm isohyet is reached, that is, the desert zone proper (Fantoli, 1952).

1.1.2 - The coastal zone or subtropical Mediterranean zone contains both arable lands and areas unfit for cultivation. This is explained by variations in the depth and continuity of the arable soil layer, whether it be the light soils of Tripolitania or the red earth of al-Jabal al-Akhḍar (Soil and Water Resources Survey Map, 1972). Areas where the soil itself is too thin or discontinuous are covered by the Mediterranean garrigue, which is useful to man as providing pasture for blocks.

1.1.3 - The interior steppe and subdesert zone consists of valley bottoms containing a certain amount of moisture, and also of parched plateaux. The former still retain some water which circulates underground, at times at depths of thirty metres or more. The only way such potentialities can be taken advantage of is through the installation of hydraulic works. On the plateaux are to be found seasonal forms of herbaceous vegetation providing pasturage for short periods of time.

1.1.4 The desert zone offers a still more striking contrast between the oases and the surrounding hammada or edeyen.

1.2 The pre-Islamic population

1.2.0 - Our information is derived from literary sources: Herodotus, Book IV (cf. Chamoux, 1953); Diodorus Siculus, Book III of his Bibliotheca historica, which though less well-known (cf. Chamoux, 1981), provides a wealth of information on the Libyan tribes and their way of life, and Pliny the Elder, Historia naturalis, Book V. For the Byzantine period, Synesius (cf. Roques, 1982) is the principal source. There has been no systematic recording of archaeological data except in the southern part of Tripolitania with the Unesco Libyan Valley Survey project (Barker and Jones, 1982; Rebuffat, 1982). For Cyrenaica, a large number of individual data are available, from different times and varying in value, which I have briefly reviewed (Laronde, 1983). Special mention should be made of the numerous figurative works, chiefly from the 2nd and to the 4th century such as the mosaics of large buildings on the coast or the reliefs found in the interior, particularly those of Qirzah (Romaneli, 1930, pending publication of Lady Brogan's study on that site).

1.2.1 - Pre-Islamic rural settlements are often difficult to date because they do not conform to classical architectural standards, with the result that it is difficult to determine the cultural identity of the inhabitants. Naturally it is possible to distinguish clusters of habitats, villages or hamlets, from scattered habitats. The latter may also have been fortified, in certain periods at least.

1.2.2 - The density of the settlements depended first on the opportunities for cultivating the soil in the area; it was naturally high throughout the arable zone of the Mediterranean but became much lower in the steppe and subdesert zone. Settlements were separated by several kilometres in the valleys like that of the Kebir wadi (Rebuffat, 1982). In the case of the tributaries of the Soffegin wadi, such as the Gobbeen, Mimoun and Lamout wadis, Barker established a correlation between the amount of available water and human and animal needs, which enabled him to estimate the size of the population and number of livestock (Barker and Jones, 1982).

1.2.3 - The density of settlements also depended on the existence of routes of communication, not only the land routes from the interior of Libya but also the Mediterranean sea routes, whose importance for Libya was enhanced by the fact that Libya was part of the Roman and later the Byzantine with the exception of Tripolitania during the period when it was occupied by the Vandals. This explains why the coastal zone of al-Jabal al-Akhdar, though less well watered than the high plateau, was densely settled, particularly near the ports (Chamoux, 1980).

1.2.4 - One should also beware of equating agricultural activity with a settled way of life. Habitats and processing equipment such as wine presses could have been put to seasonal use; conversely, regions having left apparently no other vestiges than wells or cisterns could have developed in association with other relatively distant sectors by means of arrangements that were still in existence a few years ago, before Libya embarked upon its present-day programme of rapid modernization (Johnson, 1973, p. 51). This has some influence on our assessment of the comparative importance of the nomadic and sedentary populations.

2. Forms of development

2.1.0 - The first and most widespread type of rural development in Libya involved the collection and conservation of water and moisture in view of the permeability of the soils in the Mediterranean zone and in the inadequacy of surface water resources in the interior.

2.1.1 - From the beginning of the Roman-Byzantine period, Libya made an exceptional effort to develop its springs and all other water resources by the digging of wells and the building of cisterns. Of particular interest is the map of the waterworks in Cyrenaica (Ahlmann, 1928). It shows the stability of climatic conditions that has prevailed since the beginning of the Christian era. Further evidence of such stability is given by the depth of the ancient wells to be seen in the great wadis in southern Tripolitania. The wells are generally 15 to 40 metres deep, and this proves that the water-bearing strata then were no higher than they are today. Apart from the wells and cisterns, other techniques were used to collect the run-off: the thorough cleaning of rock surfaces, the development of branches on the valley slopes towards the steppe and subdesert zone, etc.

2.1.2 - Dams on the wadis have also been found in the vicinity of Leptis Magna (Crova, 1967) as well as in southern Tripolitania where very elaborate water systems have come to light such as in the Lamout wadi (Barker and Jones 1982, p. 16).

2.1.3 - Worthy of special mention are the embankments constructed across the wadis at almost regular intervals of between 70 and 100 metres. These walls, which are built of large irregular blocks and are as a rule no more than 2 metres high, are designed to retain the arable soil and conserve a certain amount of moisture in it. We have good examples of these works in the Mimoun wadi, in southern Tripolitania (Barker and Jones, 1982, p. 15) and in Cyrenaica, in the Senab wadi, one of the high valleys in the el Cuf wadi system (B. Attiyah and S. Stucchi, 1974, p. 256). I myself have noted comparable systems on the coast near the mouth of the Giargiarummah wadi (Laronde, Kainopolis, 1983).

2.2 Among the installations for the treatment and conservation of produce from the land, the most characteristic are the remains of presses, a fact that has been recognized for a long time (Manetti, 1918). An installation in al-Baydā', in Cyrenaica, was the subject of a pilot study (Catani, 1976). It is not always easy to differentiate between an olive press and a wine press and it is conceivable that one press was used for both purposes. In any case, the spread of such installations provides a valuable clue to the kinds of crops that were grown in Antiquity. It is more difficult to recognize the specific purpose served by other structures, but we would note that the towers or pyrgoi could have been used either for the storage of crops or for defence purposes.

2.3.0 - Finally, the habitat: dwellings were either grouped or scattered.

2.3.1 - The grouped habitat comprised, on the one hand, the large villages or gasr, which were particularly numerous in the Mediterranean zone: the kômes in Cyrenaica have yet to be studied (Laronde, Kainopolis, 1983). Such villages also existed in the interior, at important points along traffic routes, as for example al-Qaryah al-Gharbia (Barker and Jones, 1981, p. 17). On the other hand, the grouped habitat might comprise only a dozen buildings, often separated by large distances, which had come together spontaneously only because of the availability of water source. This was the most common type of grouping, particularly in the steppe and subdesert zone. Defence seems to have been a secondary consideration, particularly in view of the fact that such groupings were situated on the lower slopes of valleys (Barker and Jones, 1981, p. 35).

2.3.2 - The scattered habitat consisted mainly of a farm with a courtyard enclosed by a wall, against which the various buildings were constructed. In one instance, in Cyrenaica, these buildings include a central tower of well bonded stonework; this could have been either the master's dwelling--possibly a stronghold--or a place for storing crops, or even both. In these complexes it is conceivable that the other buildings were used as sheep-folds or as sheds for equipment.

2.3.3 - In cases where the rock configuration was such as to provide shelter, troglodytic forms of habitat also existed, in some instances use being made of former tombs, a fact already recorded by the Ancients, for example by Ptolemy in connection with the Lasaniki tribe in Cyrenaica (Laronde, 1977).

3. Types of farming

3.1 The coastal zone, particularly the port areas, has its own specific features: the presence of water made it possible to raise the most delicate crops by irrigation, like those cultivated in the immediate vicinity of settlements not only in Tripolitania, around Leptis Magna (Romanelli, 1929; p. 540) or Oea, present-day Tripoli, but also in Cyrenaica, around Apollonia (Susah) and, above all, in the area west of the port, from the Hellenistic period onwards, as we know from Plautus' Rudens, the play inspired by an Athenian comedy which is set in that very region, and as we also know from the presence of several well-irrigated sites between Haniya and Maaten al-'Uqaylah (Laronde, Kainopolis, 1983). Fishing provided additional resources, as did livestock-breeding, mainly sheep and goats, on fallow land. Traces of clearly marked property boundary lines on the Cyrenain coast make it possible to determine relatively accurately the regions where livestock were raised.

3.2 Farming throughout the Mediterranean zone was based on the traditional combination of cereal crops, mainly hard wheat and barley, the planting of olive trees and vines, and the breeding of livestock, including sheep and horses. This holds true for the whole of the Gefara and for the eastern extremity of the Tripolitanian Jabal in the region of Tarhūnah (Goodchild, 1951) and Misrātah (Romanelli, 1929, p. 544), also for Cyrenaica, in the fertile crescent sweeping from Banghāzi to Darnah.

3.2.1 - Northern Tripolitania was especially noted for its olive trees, on which the wealth of Leptis Magna was based from the time of Caesar (Gsell, 1924).

3.2.2 - Cyrenaica offered two contrasting types of landscape from the beginning of the 4th century B.C., as is known from Aristotle's History of Animals, V, 30, corroborated by Strabo, XVII, 3, 23 and by Pliny the Elder's Historia naturalis, V, 5: on the one hand, open fields on the high plateau given over to the growing of cereals and livestock breeding; on the other, fields on the intermediate level planted with trees, especially olive trees. This contrast is explained by the fact that the intermediate level was sheltered protected from the dry winds of the south and, lying at the foothills of the upper level, it enjoyed better irrigation. This created favourable conditions for the cultivation of more delicate plant species like fruit trees, vines and flowers: the roses of Cyrene were famous and were used to make highly prized perfumes, according to Pliny the Elder's Historia naturalis, XXI, 10, 19. The high plateau, on the other hand, being drier and more exposed to the wind blowing from the south, the ghibli, was the area given over to the extensive cultivation of cereal crops and to livestock breeding. The traces of centuriation that are visible on aerial photographs and can still be seen on the ground owing to the presence of boundary marks or traces of ancient roads help us to reconstruct the landscape and rediscover the large domains of the Hellenistic period, above all the agri Apionis, the ancient royal domains of the Ptolemies on which the Roman State, particularly during the reigns of Nero and Vespasian, had to defend its rights against the encroachments of private individuals (Pflaum, 1962). A complementary relationship existed between the open fields of the high plateau and the plantations below: for example the same farmers worked the terraces of vines and olive groves in the Senab wadi and tilled the neighbouring high plateau. The absence or paucity of vestiges on the fertile land lying south-west of Cyrene also

suggests a connection between the farming activities carried out in these fields and the transhumant pastoral activities that were characteristic of traditional Libya until not so long ago. It follows that this area was not necessarily the preserve of the settled population.

3.3.1 - The hinterland was characterized by forms of sedentary life in the wadis of the steppe and subdesert zone. The development of the floors of valleys made possible the growing of cereals and exceptionally olive trees and even vines. Livestock, mainly goats and sheep, could be bred either in the bottom of valleys after the harvest or on the neighbouring plateaux as long as they had sufficient herbaceous vegetation. Pastoral activity of that kind was complemented by transhumance--southward between November and March, and northward between May and October (Barker and Jones, 1981, p. 35).

3.3.2 - Nomadic life as such was, above all, characteristic of the desert zone, as we know from facts that have not varied since Herodotus (IV, 172) described the movements of the Nasamons between the Awjilah oasis and the shore of the Great Surt. Such pastoral nomadism, which was combined with farming activities in the oases and in the northern areas close to the Mediterranean, was no doubt complemented by gathering activities, like the picking of silphia (cf. the Report of Dr Rajab el Athram), by distinctly commercial activities in the case of the Garamantes (Daniel, 1970, p. 19) and by more aggressive activities such as the razzia carried out at the close of the Hellenistic period, according to Diodorus Siculus, Book III (Chamoux, 1981) or during the time of the Roman Empire, according to Tacitus, Historiae, IV, 50.

4. Economic development

4.1 At the beginning of the Early Roman Empire, at the dawn of the 1st century A.D., two important and sharply differentiated forms of rural life existed side by side: on the one hand, an economy based on nomadism, which was practised by the Libyan tribes in both Tripolitania and Cyrenaica; on the other, a rural economy based on large-scale agriculture in the Mediterranean zone. These vast agricultural domains were placed under the administration of publicans who represented the interests of the Roman state, and this was especially the case of the former royal domains of Cyrenaica. Alternatively these domains, whether state or private, were subject to tribute paid to Rome, as was the case for Leptis Magna (Gsell, 1924). The recent establishment of Roman power led to clashes with the nomads that lasted throughout the 1st century A.D., beginning with the Marmarica wars of the period of Augustus (early 1st century A.D.) and ending with the campaigns of the Flavians against the Maques and the Nasamons in the last quarter of that century. On the whole, the profits resulting from agriculture promoted the development of the towns, especially those in Tripolitania, which also benefited from important trading activities.

4.2 Agricultural life in the Mediterranean zone was slow in developing until the middle of the 3rd century A.D. It may be noted, however, that the rural economy was sound, for in Cyrenaica it was not affected by an event as serious as the Jewish revolt of 115-117 A.D. A number of factors contributed to the improvement of rural life during the period: the growing efficiency of the Roman administration, the progress of Romanization and the attendant financial advantages for persons having Roman citizenship, and the development of new land without any proportionate increase in taxation. It is to be noted, however, that during the reign of Septimus Severus, the Empire increased its landholdings, especially in Cyrenaica where an 'eques' was appointed as procurator. (Reynolds, 1971).

4.3 Between the end of the 1st century and the end of the 3rd century a widespread change took place in the hinterland: the development of a settled way of life and a noteworthy effort to develop the land at the bottom of valleys. The region in question covered the Sofeggin, Zem-Zem and Kebir wadis and their branches, stretching as far west as al-Hammādah al-Hamrā, up to the outskirts of ash-Shuwayrif and south beyond al-Bu Njem (Rebuffat, 1982). It also extended to the littoral around Tmed Hassan and Surt, and spread south of Cyrenaica and into the al-Jabal al-Akhḡar hinterland between al-Abjār and al-Makīlī, as well as into the interior of Marmarica to the south of Tubruq. It is to be hoped that an exploration similar to the one made in southern Tripolitania will be carried out in Cyrenaica. The settlements were always on a small scale, and the number of persons living off each production unit was limited: the fifty hectares of land that formed the principal site in the Mimoun wadi may have provided grain for around forty people and oil for around a hundred, according to Barker (Barker and Jones, 1982, p. 20). The fact that the Roman army, at the time of Severus, was established there for half a century and was a large consumer of agricultural produce does not mean that there were sufficient local resources to meet its needs; most food supplies still came in from the coast (Rebuffat, 1977, p. 409). The settling process and concomitant agricultural prosperity in the region were not the effect but the cause of the presence of the Roman army; they continued long after the Romans left, proving that they were indigenous to Libya, and that rural life in Libya was predominantly autarkic. As a matter of fact, Ghirza continued to prosper well into the 4th century: reliefs on tombstones portray both hunting and farming scenes, the latter with representations of vines, olive and pomegranate trees in addition to cereals; dromedaries, too, now figure prominently. The only development that can be associated with the withdrawal of the Roman army was the appearance of fortified farms (Barker and Jones, 1982, p. 3).

4.4 During the Byzantine period, from the 4th to the 7th century, there was a change in the balance of the economy which was largely due to a slowing down of trade. The complementarity that characterized the relationship between the Mediterranean zone and the interior lost its importance. The major event in the life of the people along the coastal littoral in Tripolitania was the invasion of the Vandals. Although they did not occupy the whole region, they impeded the development of urban life and isolated the region, despite the short-lived return of the Byzantines. The attacks of the nomads did not cause any particular disruption of rural life, judging by the case of Cyrenaica: although Synesius deplored such attacks (Roques, 1982), the density of rural settlements there reached its highest point at that time. It is possible that the development of the power of the Church contributed to its siphoning off of a large part of the agricultural resources, if one is to judge by the number of churches both in big and small towns and in the countryside. The autarkic tendency of the region and its withdrawal into itself are illustrated by the fact that, according to Synesius, the peasants from the villages on the high plateau never saw a fish, and took eels for snakes.

4.5 The hinterland kept up its settled way of life in some places well into the Islamic period (Barker and Jones, 1981, p. 38). But progress in that direction was halted from the beginning of the 4th century, primarily because of the overworking of the land from the 1st century onwards, which resulted in irremediable damage to the plant cover, replaced by crops, and accelerated soil erosion. At the same time, the exhaustion of surface water in a number of places intensified the process of desertification. The nomads therefore inherited the desert; they did not create it (Le Houérou, 1959, p. 118).

Conclusion

1. Examination of the facts shows the overall stability of the environment. The changes that occurred from Antiquity to the present are local in nature and are due to changes in the microclimate, the disappearance of forms of vegetation that were already residual in Antiquity and the destruction of the soils. These conclusions hold good in particular for the steppe zone and the more vulnerable subdesert zone.
2. Despite the break-up of Libya into the two provinces of proconsular Africa (subsequently Tripolitania) and Cyrenaica, and the kingdom of the Garamantes in the interior, the rural life of the country displays a certain degree of unity within each of the geographical regions described. The quality of rural development also merits attention.
3. The situation that prevailed at the time of the Roman empire was already substantially called into question in the Byzantine period, before the arrival of the Arabs.

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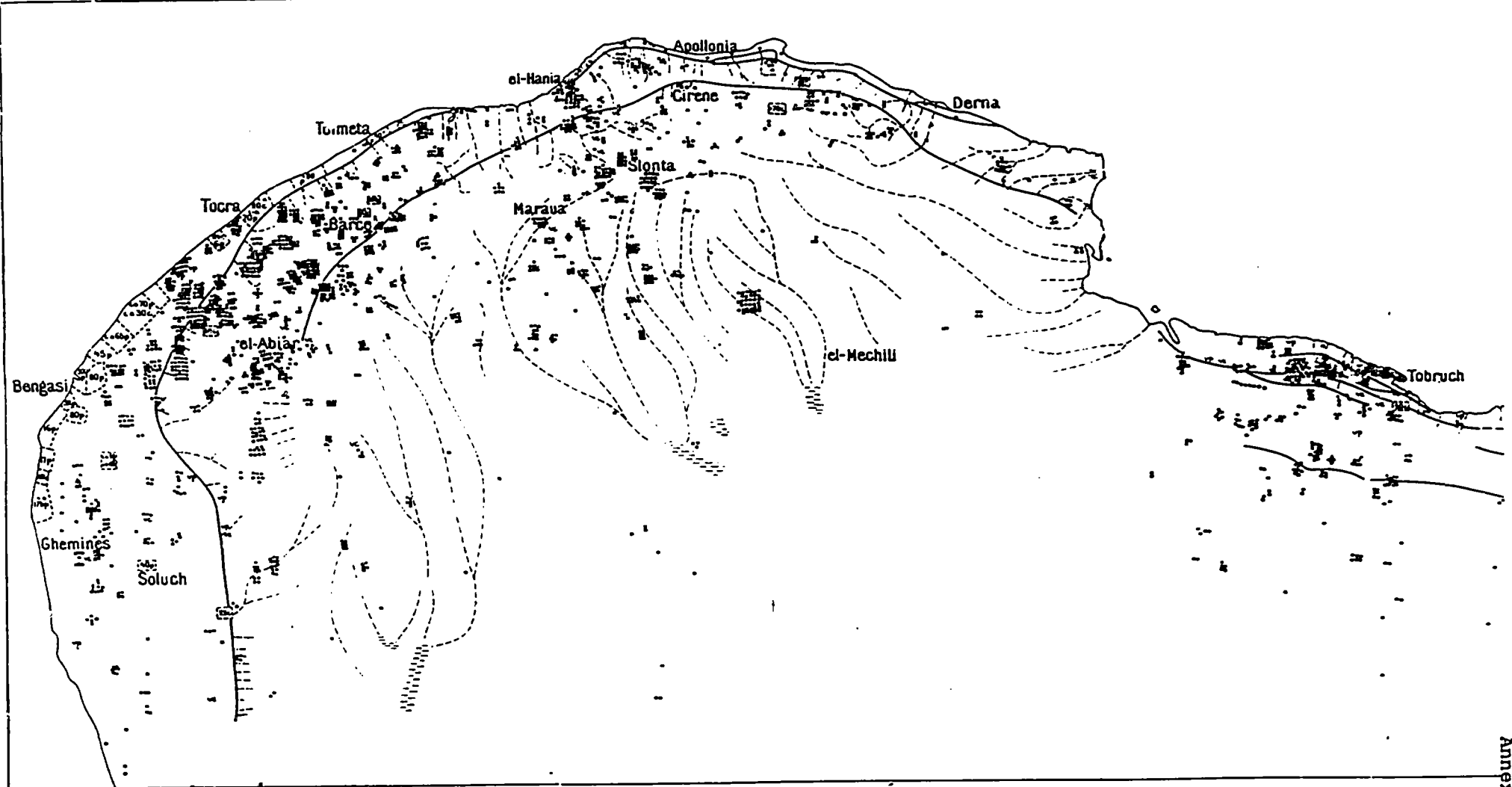
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ANNEX I

MAP OF KNOWN SPRINGS, WELLS AND CISTERNS IN THE BARQAH PENINSULA AND MARMARICA

H.W. Ahlmann

GEOGRAFISKA ANNALER 1928



Scale: 1:1,000,000

Key: black squares = springs; white squares = wells; black circles = usable cisterns; open circles = cisterns no longer usable; p = wells; c = cisterns; vc = several cisterns, the exact number of which is not indicated.

ANNEX II

Barker and Jones (1981)

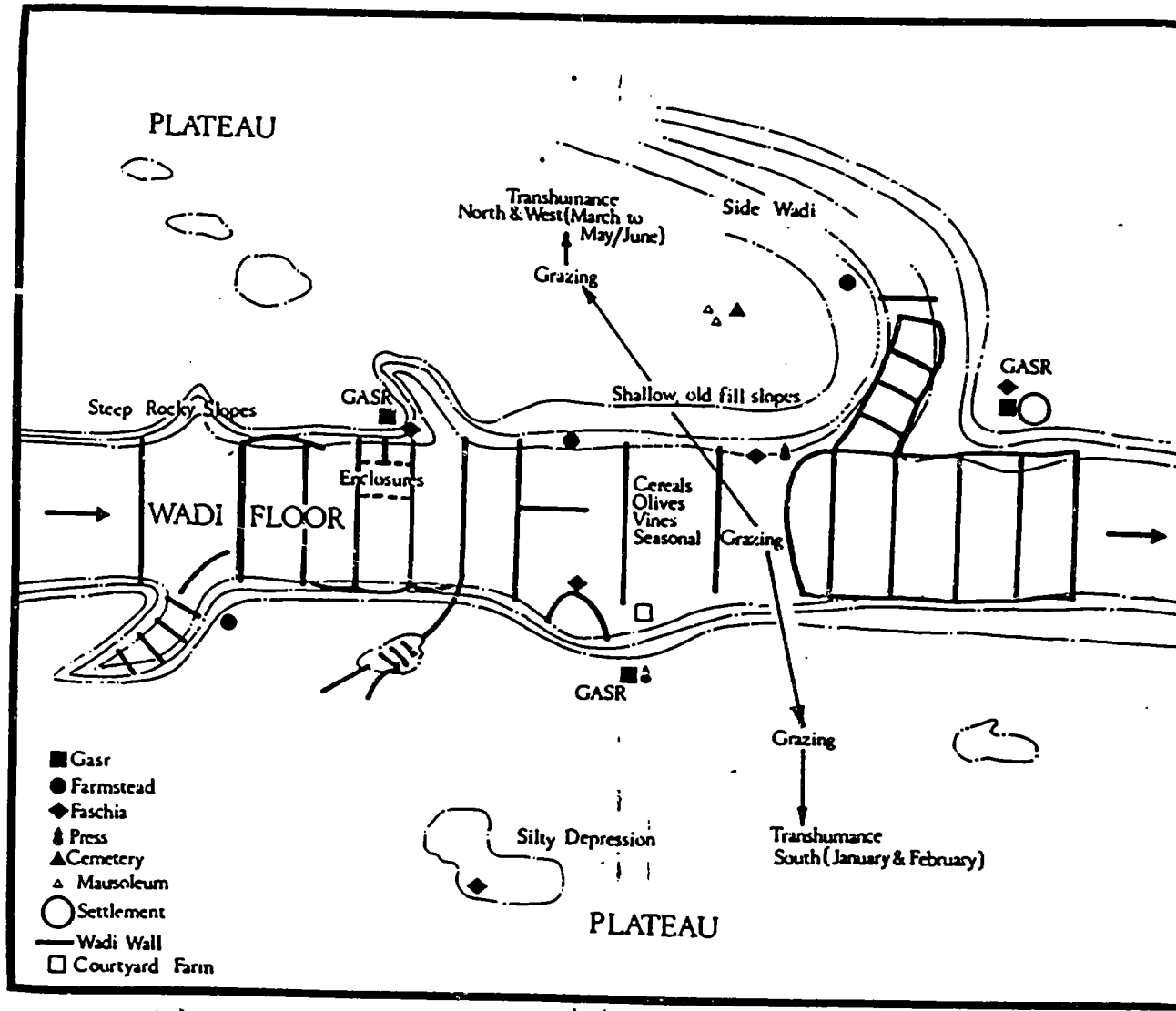


Figure 11. A simplified schematic view of the layout of gasr, wadi walls and associated features in a typical wadi sector.