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Sirkeli Höyük

The Discovery and Exploration of a Complex Urban Landscape in Iron Age Cilicia

Dedicated to my good friend and colleague Ünsal Yalçın

Introductory Remarks*

A central objective of the projects Sirkeli Höyük. An Urban Settlement on the Puruna / Pyramos (2012-17) and Sirkeli Höyük. Structure and Dynamics of an Ancient Cityscape in Plain Cilicia (2018-22) of the University of Bern is the study of the urbanistic structure of an ancient settlement in Plain Cilicia (Southern Turkey) (Novák *et al.* 2019: 1–2). This is important as up to now, comparatively little information is available on the structure of Cilician cities. The reason for this is that almost all excavations in Cilicia have so far focused on the actual mounds, and the question of the existence of lower towns has played a subor-

dinate role. In many cases such as Mersin-Soli Höyük, Mersin-Yumuktepe, Tarsus-Gözlukule and Adana-Tepebağ, an archaeological investigation of lower towns would be extremely difficult, anyway, due to dense modern occupation.¹ However, these four sites were the first to be archaeologically investigated in Cilicia in the early and mid-20th century. Archaeologists inevitably limited their excavations to the mounds themselves, and so Cilician Bronze and Iron Ages sites appeared relatively small compared to contemporary sites in Northern Syria and Mesopotamia. The situation changed with the excavations at Kinet Höyük by Marie-Henriette and Charles Gates, where it became apparent that this ancient harbour town already had

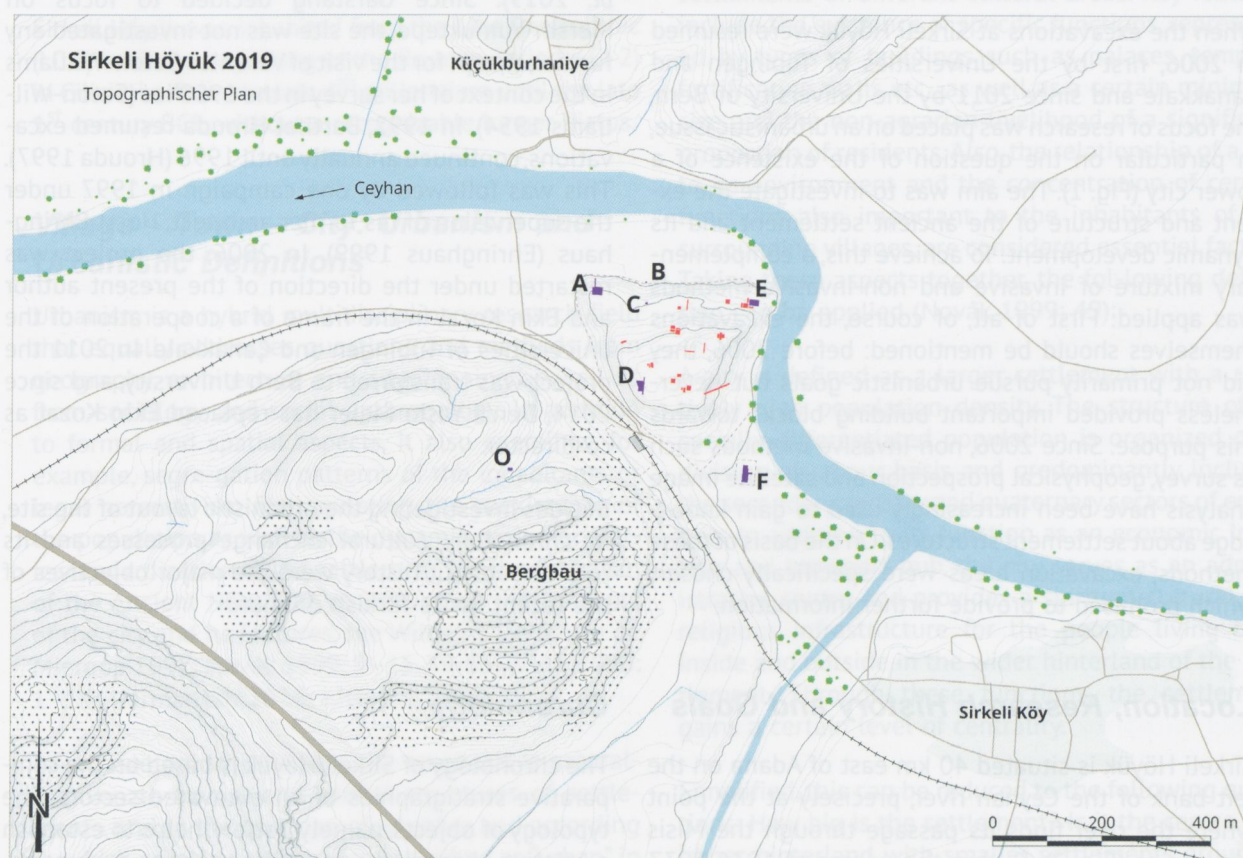


Fig. 1: Topographic plan of Sirkeli Höyük (© Susanne Rutishauser, Sirkeli project, Bern University).



Fig. 2: Aerial photo of Sirkeli Höyük, Yılan Kale in the background (© Sirkeli Project, Bern University).

a lower town enclosing the mound during the 2nd and 1st millennia BCE (Cilician Chronology Group 2017: 177, Fig. 9). The ancient settlement was thus considerably larger than the topography of the mound alone would have suggested.

When the excavations at Sirkeli Höyük were resumed in 2006, first by the Universities of Tübingen and Çanakkale and since 2011 by the University of Bern, the focus of research was placed on an urbanistic issue, in particular on the question of the existence of a lower city (Fig. 1). The aim was to investigate the extent and structure of the ancient settlement and its dynamic development. To achieve this, a complementary mixture of invasive and non-invasive methods was applied: First of all, of course, the excavations themselves should be mentioned: before 2006, they did not primarily pursue urbanistic goals but nevertheless provided important building blocks towards this purpose. Since 2006, non-invasive methods such as survey, geophysical prospection and satellite image analysis have been increasingly used to gain knowledge about settlement structures. On the basis of these methods, excavation areas were specifically chosen, which promised to provide further information.

Location, Research History and Goals

Sirkeli Höyük is situated 40 km east of Adana on the left bank of the Ceyhan river, precisely at the point where the river finds its passage through the Misis Mountains (Fig. 2). During the winter of 1936-1937, John Garstang directed the first excavations at Sirke-

li Höyük (Garstang 1937; 1938; Ahrens 2014). On this occasion, a rock relief showing the Hittite King Muwattalli II (ca. 1290-1272 BCE) was discovered (on the history of Muwattalli II, see Klengel 1999: 202–218; on the relief Kozal & Novák 2017; Marazzi *et al.* 2019). Since Garstang decided to focus on Mersin-Yumuktepe, the site was not investigated any further, except for the visit of Veronica Seton-Williams in the context of her survey in the 1950'ies (Seton-Williams 1954). In 1992, Barthel Hrouda resumed excavations, continued annually until 1996 (Hrouda 1997). This was followed by one campaign in 1997 under the supervision of his former architect, Horst Ehringhaus (Ehringhaus 1999). In 2006, the project was restarted under the direction of the present author and Ekin Kozal in the frame of a cooperation of the universities of Tübingen and Çanakkale. In 2011 the project was transferred to Bern University, and since 2014, Deniz Yaşın Meier has replaced Ekin Kozal as co-director.

Besides investigating the urbanistic layout of the site, its chronology, cultural exchange processes and its role throughout history were the major objectives of the recent Swiss-Turkish mission.

Chronology

The chronology of Sirkeli Höyük is based on the comparative stratigraphies of all excavated sectors. The typology of objects, namely pottery, helps to establish a relative chronology, scientific analyses such as radiocarbon dating contribute towards an absolute

chronology (on the methods approached, see Novák *et al.* 2019: 16–18).

Initially, the stratigraphy of each sector is established individually and separately, thereafter correlated within the various areas of the ancient settlement such as Lower Town (“U”), Plateau of the Citadel (“P”), Inner Citadel (“Z”), Upper Town (“O”) and Suburb (“V”). In this way, it has been shown that in Sirkeli, several particular stratigraphies exist related to respective parts of the settlement (Fig. 6). On the basis of these stratigraphies and the characteristics of architecture and artefacts, an overall periodization has been defined. To avoid any misinterpretation or misunderstanding, these periods are not named after the commonly used Metal Age terminology (“Iron Age”) but instead according to a neutral regional “Cilicia” periodization, which was adopted and developed within the “Associated Regional Chronologies for the Ancient Near East and the Eastern Mediterranean (AR-CANE)” project (Lebeau 2011: 2). The new regional terminology for Cilicia used in Sirkeli introduces “Early Cilician” (ca. 3000-2050 BCE), “Old Cilician” (ca. 2050-1560 BCE), “Middle Cilician” (ca. 1560-1190 BCE) and “Neo Cilician” (ca. 1190-330 BCE) Periods, abbreviated as ECI, OCI, MCI, and NCI, respectively (Novák *et al.* 2019: 33–45). LCI means Late Cilician Period, dating from 330 BCE until AD 636. The period of interest, here, is the Neo-Cilician (NCI).

Sirkeli Höyük was inhabited from the Late Chalcolithic (LC 1) until the beginning of the Roman period (LCI 2) in Cilicia, i.e. from the late 4th millennium until the late 1st century BCE, without a recognizable longer hiatus.

Village – Town – City: Urbanism and Urbanistic Definitions

Urbanism is a hybrid multidisciplinary research field that equally addresses questions and methods from geography, architecture and cityplanning as well as from sociology and social anthropology. In addition to formal and spatial aspects, it also examines, for example, segregation patterns of the inhabitants or legal normativism for regulating the coexistence of the population as well as the dynamic design or static standardization of the settlement (on the urbanism of the Ancient Near East as well as on the concepts of the city and its features, see Wilhelm 1996; van de Mierop 1997; Novák 1999: 9–15, 39-63; Wirth 2000: 1–14; Harmanşah 2013; Liverani 2013).

In archaeological urbanism, the emphasis is naturally given to formal and spatial structures of settlements, and to the question of whether and according to which criteria sites can be described as “urban” in a narrower sense. Questions concerning e.g. ethnic,

religious or social patterns of segregation or legal norms, can usually be answered only in a very rudimentary manner, unless there are significant written documents with corresponding information. The latter is not the case in Cilicia, as in most regions of the ancient Near East outside of Babylonia, Assyria, Elam and Egypt. For example, social segregation could be recognized if several residential areas have been extensively uncovered and indicators for the social status of the respective inhabitants have been evaluated. Yet, this does not apply to any single settlement in Cilicia excavated to date. Therefore, the following remarks will focus on the formal and functional structure of the ancient settlement and try to trace its diachronic evolution. Firstly, it is important to take a brief look at the concept of “urbanity” itself, and to consider the definition of a “city”, in order to classify the ancient settlement on Sirkeli Höyük accordingly.

The term “city” has been defined differently in various disciplines and academic fields. In Europe, it has been associated with the granting of a legal status with special privileges and obligations, a legal concept applied since the Middle Ages, but also valid in Greco-Roman antiquity. Yet for other cultures which did not apply such legal criteria, the corresponding definitions are not valid. This is why, in the study of antiquity, cities are defined according to archaeologically verifiable criteria which can be transferred to settlements of different cultural areas. Key features include the existence of specific functions, represented by types of buildings such as palaces, temples, fortification walls etc., as well as a certain minimum size and the non-agrarian livelihood of a significant proportion of residents. Also, the relationship of a site to its environment and the concentration of certain functions also important to the inhabitants of the surrounding villages, are considered essential factors. Taking these aspects together, the following definition can be applied (Novák 1999: 49):

A city is defined as a larger settlement with a relatively high population density. The structure of its socially differentiated population is organized on a division-of-labour basis and predominantly includes the secondary, tertiary and quaternary sectors of economy. In addition to its function as an economic location and transport hub, the city serves as an administrative centre and provides a spiritual-cultural and religious infrastructure for the people living both inside and outside in the wider hinterland of the settlement. Through these functions, the settlement gains a certain level of centrality.

Simplified, this can be reduced to the following questions: How big is the settlement? Is it the centre of a larger hinterland with smaller settlements grouping around the site along an approximately concentric

route network (Rutishauser 2017: 131–137; 2020)? Is the location densely occupied? Are there monumental, “public” buildings with functions that go beyond living? Are there indications of inner structuring and hierarchization? On the basis of these criteria, the place will be assessed in the following as either a city or village. But first, we will describe the methods applied to the investigation of the site’s extension and functional structure.

Methods

Remote Sensing and Topography²

While initial campaigns until 2011 made use of a topographical plan of the mound created by the Technical University of Munich in 1997, since 2011 a new general plan is in the process of creation. The current plan now covers the entire area from Yılan Kale in the north to the modern highway in the south (Fig. 1). The topographical survey was primarily carried out from the ground, using GPS and tachymeter, supplemented by remote sensing data.

With the help of remote sensing, i.e. aerial photographs and satellite images, under favourable conditions it is possible to identify structures that are not visible from the ground. The success depends on various factors such as the angle of the shot, time of day, lighting conditions, vegetation, and the type of electromagnetic radiation and the sensors receiving it. Especially for archaeological questions, historical aerial and satellite image data such as the CORONA images of the 1960’ies and 70’ies are important, because these satellite images document the cultural landscape before the intensification of agriculture and the expansion of settlements.³ Additionally, the images of the TanDEM-X satellite mission are of high importance, since they are unsurpassed in accuracy and based on a uniform database.⁴ The high-resolution elevation models generated therein allow the mapping of paleo-river courses that could not be identified with the previous data (Rutishauser *et al.* 2017). By using these remote sensing methods, it was possible to gain important information on some ancient buildings and the surrounding landscape of Sirkeli Höyük. Especially the two WorldView scenes turned out to be interesting, as a number of structures on the surface of Sirkeli Höyük were revealed, which can be related to archaeological features and ancient excavations. On the northern slope, between the plateau of the northern terrace and the inner citadel, for example, two parallel linear structures can be seen at a distance of almost 10 m, which have a length of 40–70 m. These are probably fortification walls which have already been recorded in a trench excavated by Barthel Hrouda (Hrouda 1997: 107–108).

Geophysical Prospection⁵

Three methods of geophysical prospection have been applied in Sirkeli Höyük so far: geomagnetic mapping, geoelectric depth sections and geoelectric surface measurements.

Magnetic prospection is based on the fact that archaeological features and finds, especially metal objects, cause magnetic anomalies in the earth’s natural magnetic field. At Sirkeli Höyük a 90’000 m² area has been magnetically surveyed so far. As a measuring instrument, a highly sensitive caesium magnetometer (GEOMETRICS G-858) with two sensors was used. The values measured were visualized in a Geographical Information System (GIS) as a raster image in grayscale. In addition to magnetic prospection, geoelectric tomography and geoelectric area measurement were carried out at select locations. These are two similar methods, based on an arrangement of electrodes in a square for area measurement and in a chain of electrodes up to 79 m long for tomography in order to generate depth profiles. Another important difference between the two methods is that geoelectric surface measurement only detects structures at a predetermined depth of 0.5–1 m. In electrical tomography, on the other hand, the depth that can be achieved depends solely on the distance between the electrodes. The greater the distance between the electrodes (up to 26 m), the deeper the layers that are detected. In an ideal setting, a depth of 9 m below the surface of the terrain can be measured. During the measurements at Sirkeli Höyük, the distance between electrodes was set to 1 m, as this is sufficient for archaeological questions. The three methods are complementary: while magnetics can reveal hidden structures below the surface in the form of a magnetogram over a large area, the aim of creating geoelectric profiles is to supplement the results of two-dimensional magnetic mapping with depth information.

To the south of the main mound, magnetic prospection has revealed a large area of buildings belonging to a hitherto unknown lower town. It is limited in the east by two parallel walls, 5m apart, the outer of which is narrower than the inner according to electrical tomography. Electrical tomography also indicates that the double wall ring was bordered at the outside by a moat, which can also be clearly seen through electrical surface measurement. The excavation of Sector F was subsequently laid out in the area of a setback angle in the course of the wall, where a street and a gate were clearly recognizable in the magnetogram. The interior of the settlement shows a relatively regular system of roads and paths as well as buildings.

Important structures show up as several dipole anomalies, detected by magnetic prospection and indicative

of high temperature areas, i.e. larger kilns or ovens. Some of them are located inside but the majority outside of the fortified settlement. Due to the high concentration of these anomalies, workshop areas could have been located there.

Survey

The structures discovered during remote sensing and geophysical prospection could not be dated from these methods. Therefore, a systematic surface survey was started in 2007 in the plain north of the mound, extended in 2011 to include the areas west, in 2012 south-east, and in 2017 south of the mound (Kozal *et al.* 2019: 64–85) as well as on the opposite side of the river; finally, in 2018 extending to the hilltops south and south-west of the citadel mound. The same strategy has been followed to survey the surface in parallel with geophysical prospecting to correlate evidence of building structures with datable artefacts.

Methodically, a grid was created of square units, with a side length of 20 m each. The artefacts, which with few exceptions were ceramic sherds, were then recorded and dated according to this grid system. In connection with geophysics, some special phenomena could then be observed and interpreted, e.g. anomalies that could be identified as possible ceramic kilns. This interpretation was reinforced by the fact that in this very area there were also slags and misfires, including one in which the corner of the wall of a kiln is still baked with the sherds. While ceramic finds from the Chalcolithic, Middle Bronze Age and Iron Age were collected in the area north and west of the mound, in the south-eastern lower town mainly Iron Age and a few Late Bronze Age ceramics were found (Kozal *et al.* 2019: 64–85).

Since 2017, the areas on the opposite northern side of the Ceyhan river, at the foot of Yılan Kale (Halama *et al.* 2019: 121–146), as well as on the two hilltops south of Sirkeli Höyük and the railway line⁶ have also been surveyed and prospected within the frame of two subprojects. In the area on the other side of the river, an extensive settlement has been registered, which slopes down to the river from north to south and is divided in its central axis by a small creek into a western and an eastern hilltop. Geophysical prospection revealed a larger rectangular building near the spring of this watercourse. The other areas of the settlement area were densely built up according to geophysical prospection. The surface pottery showed a spectrum from Chalcolithic to Late Antiquity, with a high concentration in Middle Bronze and Iron Age, i.e. exactly the periods which are also dominantly represented at Sirkeli Höyük and in its lower

town. This area is considered a suburb of the same ancient settlement.

The hilltop southwest of Sirkeli Höyük has been known since the 1990's as the place of an extensive necropolis with elaborate shaft and chamber tombs carved into the rock. Numerous graves are visible on the surface as a result of looting activities. The neighbouring hilltop to the east of the first one, separated from it by an incised valley with a small creek, has been used in the past decades as a mining area for cement. For a long time, it was not known that this was also an archaeological site. Geophysical prospection in the southern lower town had shown that the settlement extended almost to the course of the modern highway. The ancient roads identified, here, all run towards the hilltop to the west of it, namely the one which serves as a mining area. Due to modern activities, only occasional inspections are possible. But even here, larger accumulations of ceramic sherds and isolated wall structures were discovered on the surface. As a result of these findings, the protected area of the western hilltop was intensively investigated geophysically, by surface inspection and finally, in 2019, by excavations. Surprisingly, it was recognized that not only is there a large amount of pottery on the surface, but almost all of it dates back to the Bronze and Iron Ages. Hellenistic pottery was only found in a few individual pieces even in the area of the looted chamber tombs, so that doubts arose on the traditional dating of the necropolis. It seems more likely that the necropolis was already built during the Iron Age, at the latest. Geophysics also showed that the tombs were not built in isolation, but in the middle of a dense occupation that extended over the entire hilltop. Excavations, that started in 2019, have now confirmed this dating.

Particularly surprising was the discovery of a section of the Iron Age city wall in the north-west of the "Necropolis Hill", which was uncovered by modern construction work and testifies to the fact that both hilltops were inside the fortification and were thus integral parts of the fortified city complex. Accordingly, the intramural area of Sirkeli Höyük together with its suburb occupied a territory of more than 70 ha!

In addition to the surface surveys carried out in the area, a 2.5 m wide strip was staked out on the steep southern slope of the Citadel mound, from foot to top. The surface was cleared of vegetation and then unhooked. Afterwards, the pottery was collected meter by meter in height sections, in order to gain information about the thickness of the respective deposits of a period. This surface scraping confirmed the existence of thick layers from the OCI and the NCI Periods, while the MCI Period is attested, but comparable less well preserved.

Excavation

In addition to these non-invasive methods, conventional excavation was naturally also carried out (see Fig. 1). The choice of excavation sectors was primarily based on the results of the geophysical prospection. At the expense of uncovering individual buildings completely, it was decided to spread the excavation activities over several areas distributed over the entire occupied site, in order to obtain the broadest possible picture of type of buildings and their dating.

Sector A in the northwest of the lower plateau of the outer citadel was opened in an area that had hardly been covered by previous excavations, but which had brought to light a lion-shaped basalt column base in 1936 – a clear indication of the existence of a monumental building (Ahrens 2014; Ahrens *et al.* 2019a: 147–209). Sector E represents the continuation of the work of Barthel Hrouda and Horst Ehringhaus in the area of a stone building, which must have been connected to the rock reliefs in the northeastern corner of the plateau (Kozal & Novák 2017). Sector C was opened in the centre of the plateau to verify a building structure emerging from the satellite image and the geophysics (Ahrens *et al.* 2019b: 235–236), similar motivations underlay the excavation in Sector D on the summit of the inner citadel mound to the south (von Peschke 2019b: 291–337). Sectors B (Sollee *et al.*

2019a: 116–118) and F (Sollee *et al.* 2019b: 86–115; Sollee *et al.* 2020) were chosen to investigate the city wall discovered by geophysics, the latter at a point where a city gate was detected. Finally, Sector O was opened in the area of the ne-cropolis on the western hilltop, to investigate the integration of graves into the buildings discovered there. The sectors are thus distributed over different parts of the settlement area: Sectors A, C and E are situated in the northern, somewhat flatter plateau of the outer Citadel, Sector D in the inner Citadel, Sectors B and F in the area of the Lower Town and the city wall, and Sector O finally in the Upper Town. Thus, the results obtained in these sectors can be used to gain an overall picture of the design and structure of the ancient settlement (Fig. 3).

The excavations will not be dealt with in detail here. It should only be pointed out that the findings in Sector F, for example, impressively confirm the geophysical results: Here, exactly at the location previously determined and at the depth predicted, were uncovered a fortification system consisting of two parallel city walls with foundations made of large, regularly hewn stone blocks, a paved road leading through the city gate into the interior of the city, and a large building (Sollee *et al.* 2018; Sollee *et al.* 2019b: 86–115; Sollee *et al.* 2020).

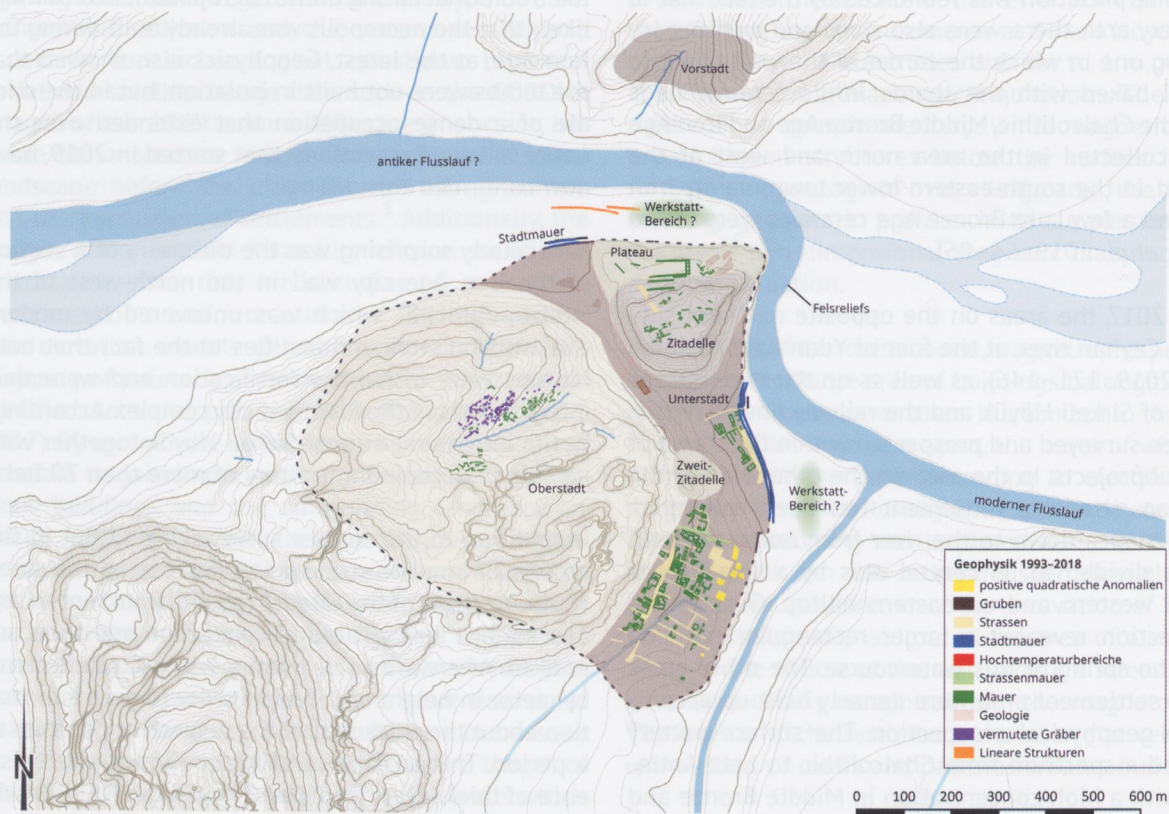


Fig. 3: Functional plan of Sirkeli Höyük in the NCI period (© Susanne Rutishauser and Joëlle Heim, Sirkeli Project, Bern University).

The Iron Age Settlement

Morphological Situation and Settlement Development

A rocky outcrop – a lower, northernmost extension of the Misis Mountains on the left bank of the Ceyhan, which finds its continuation on the opposite shore of the Ceyhan at the mount carrying the medieval Yılan Kale – forms the eastern flank of the Sirkeli Höyük, where it forms a nearly vertical wall. In Imperial Hittite times, on its eastern face were placed two royal reliefs. Its western side, meanwhile, was less steep and possibly formed different terraces.

The first settlement was obviously built in the shelter of this rock's western slope. Although the earliest known findings date back to the Late Chalcolithic, it cannot be ruled out that settlement began earlier, since the earliest levels are deeply hidden under massive, later overbuilding. One should bear in mind that the surface scraping at the southwest of the citadel mound shows that there are still some 15 m of cultural layers of yet unknown dating below the altitude of the Late Chalcolithic levels from Barthel Hroudá's excavations (Hroudá 1997: 105–106).

During the millennia of occupation, the settlement seems to have grown upwards gradually from the western part of the later citadel, not only in general elevation but also along the western slope of the rock spur to the east, until it was almost completely overbuilt. The rock could have been used not only as a natural barrier to the alluvial plain of the river and a protection from flooding but also as a kind of fortification. Therefore, the rock spur can be considered an integral part of the settlement, which was gradually occupied and overbuilt, until it emerged only in a few places within the citadel. This was certainly the case already during the NCI period (1190–330 BCE), when the mound was used as a bipartite walled citadel, separated from the lower and the upper town.

Primary Citadel (“Plateau” and “Inner Citadel”)

In the Iron Age, the proper mound at Sirkeli Höyük formed a strongly fortified and elevated district, measuring 350 m x 300 m, located on the northern periphery of the extended urban complex, not far from the southern shore of the Ceyhan River. Hence, one could consider the citadel “defined as an elevated area within a settlement, separated from the residential sector by both its height and its fortifications. Access to this fortified district was restricted or at least controlled, thus indicating segregation, be it of political, ethnic, religious or social nature. Further-

more, the citadel had a strong symbolic value: It was a highly visible, heavily fortified stronghold controlling city and polity” (Novák 2018: 255).

A significant height difference, resulting both from the long occupation history and from the natural rock formation, subdivided it into a lower plateau, the “Outer Citadel”, to the north, and a much higher area, the “Inner Citadel”, to the south. This subdivision of a citadel into two distinct parts was reinforced by a fortification wall in between, added at the latest during the 11th century BCE (1997: 107–108). It was a glacis-like wall with steep slopes, which was set against the debris of earlier occupation phases and constructed of midsized limestones without mortar. Several linear, parallel structures running west to east in the area between the plateau and the Inner Citadel, visible in the geophysical prospections, suggest that the excavated segment may have been only a part of a multi-walled, complex fortification system. A ramp or stairway that led from the plateau to the interior of the Inner Citadel can be localized near the western edge, directly below the still used modern pathway connecting Sectors A and D. However, this area is still untouched by excavation, even though a “Trench D” was constructed by J. Garstang in 1936/7, not far to the southwest (Garstang 1938, Pl. 14; Ahrens 2014: 56 Fig. 6, and 57 Fig. 8).

A very similar fortification system was discovered at the northern edge of the plateau of the outer citadel, opposite of the plain north of the mound (Fig. 4): In a step trench north of sector A, a series of narrow stone walls were exposed, running parallel to each other and to the edge of the mound on very different elevation levels (each one deeper to the north). The walls obviously served as slope protection to support a steep glacis. The lower end of this fortification system, which has not yet been surveyed, is probably attached to the inner city wall. The fact that the city wall ran along the northern edge of the hill immediately below it, is proven not only by the results of geophysical prospection but also by excavations in sector B (Sollee *et al.* 2019a: 116–118).

Both the Outer and the Inner Citadel were densely built-up, with more or less regular residential houses (e.g. Areal 6, Phases 2–3, in von Peschke *et al.* 2019a: 258, pict. 218) as well as circular buildings (Areal 2, Phase 4, in von Peschke *et al.* 2019a: 257, pict. 217)) and larger structures such as Building A1 in Sector A (Ahrens *et al.* 2019a: 147–209), Building C1 in Sector C, and several structures visible in geophysics in the Outer Citadel as well as the large square Building D1 (von Peschke *et al.* 2019a: 291–337) at the summit of the Inner Citadel close to its southwestern edge (Garstang 1938: Pl. 14).



Fig. 4: Orthorectonal aerial photo of Stone Building A1 in Sector A. In the upper part the step trench with the retaining walls of the slope protection (© Marosch Novák, Sirkeli Pro-ject, Bern University).

It is still unclear where the main entrance to the entire citadel was. The southeastern, southern and western sides of the inner citadel were and are too steep towards the Lower Town, and the difference in level is too high to enable direct access. Thus, the ramp from the Outer up to the Inner Citadel remains the only hitherto localized and probably original access option to the latter. How and where the plateau, and thus the Outer Citadel, was accessible from the lower town and/or from the outside remains questionable. The morphology and topography of the Lower Town suggest that the best possible access should have been, on the one hand, along the western edge of the mound, up to the area southwest of Sector A, on the other hand, to the southeast of Sector E at the Bronze Age Stone Building E1 above the reliefs. Present access routes follow these two possible ways. Both would have provided access to the Citadel from the Lower Town. A third access option could have existed in the northeast of the plateau, to the west of Sector E, i.e. an access from the extramural plain near the river course. Here, the terrain of the plateau towards the outside area lowers slightly and, according to geophysics, follows a natural rock formation. However, these postulated access routes still await confirmation through excavation.

According to the above quoted definition (Novák 2018: 255), the mound at Sirkeli Höyük can be considered a proper citadel during the period NCI and had been such already in the 2nd Millennium BCE. Its access was restricted or at least controlled, thus indicating segregation, be it of political, ethnic, religious or social nature. Furthermore, the citadel had a strong symbolic value: It was a highly visible, heavily fortified stronghold controlling the entire city.

Lower Town

The extensive Lower Town was enclosed by a double fortification wall, with a moat running in front of it (Sollee *et al.* 2019: 86–115; Sollee *et al.* 2020). The city wall also formed the northern boundary of the citadel.

According to the distribution of surface ceramic sherds discovered in the survey at least parts of the Lower Town were already occupied during the 2nd Millennium BCE in the periods OCI (2050–1560) and MCI (1560–1190 BCE; Kozal *et al.* 2019: 67–68, pict. 42, 43). Respective architectural remains of Period OCI were discovered in a small sounding close to the NCI city wall (Sollee *et al.* 2020). However, the wall itself in the present form was founded late in Period NCI 2. Its alignment can be traced by geophysics and excavation over a long distance, not only in the area of the southern and southeastern Lower Town but also, for example, northwest of Sector A below the plateau in the plain. Moreover, it can be tracked further south of the modern road and the railway tracks, and to the northwest of the Necropolis hill, leaving no doubt that it enclosed it. The city wall's architecture was explored and investigated on a very limited scale in Sector B, at the foot of the middle section of the plateau, and in a much more comprehensive way in Sector F, in the southeastern Lower Town.

While the western, northern, and eastern sides of the city fortification can thus be determined with some certainty, the location of the southern limit remains completely uncertain due to massive disruption caused by the activities of the modern quarry and the building of a modern highway. At any rate, it can be stated that the wall bordered directly on to the northern side of the citadel, thus giving the citadel a peripheral location in the cityscape. The Lower Town expanded to the west, east and south of it. The two “ends” of the trapezoidal plateau – the area around Sector A in the northwest and the former cult complex around the stone house E1 and the rock reliefs in Sector E in the northeast – were exposed and overlooked the river valley and the extramural landscape.

The fortification system consisted of two parallel stone walls, which left an open space of about 5 m in between them (Fig. 5). The front of the outer wall was protected by an almost 30 m broad moat, which might have drained the water of the Sarı Kulak Deresi. This small tributary to the Ceyhan river is north-bound, springs in the nearby Misis Mountains and, nowadays, joins the Ceyhan about 300 meters east of the city wall. The double wall can also be well tracked on satellite images in the vegetation of the plain. Both walls had a basement area built of stone blocks and quarry stones and a structure of mud bricks. Although the outer wall was only slightly narrower than the inner wall, it was probably lower for the sake of a better defense. It seems that both walls had towers at regular intervals. The walls show battle marks and several modifications, all of which date to the Period NCI (Sollee *et al.* 2019a: 99–102). However, the natural soil has not been reached so far: The inner wall is situated apparently on older burnt debris.

Until now, only one gate system has been safely located and partially excavated. It is constructed as a chamber gate with axial passage and was stone-paved, including a covered drainage channel. This gate, the design of which was modified several times, provided access to the river but also to the overland highway that ran along the south bank of the Ceyhan to the east into the Yukariova plain and the Amanus pass.

From the gate, a wide main street, easily recognizable by geophysics, opened up the adjoining quarters, from which smaller side streets branch off. These offered access to the various residential buildings. As previous, spatially limited excavations in Sector F show, these were also subject to multiple modifications and some still intact inventories remain, which provide important data towards determining the function of the rooms and a narrower chronology. Unquestionably, more extensive excavations are worthwhile, here, as no information has been obtained yet on living conditions in subcities of Cilician settlements. Questions on possible segregation patterns could also be answered.

Geophysical prospection has identified a major section of the Lower Town south of Sector F, the old highway and railway line, north of the modern highway. The main axes of the road grid run in a north-south direction and the side roads branching off from it run in an east-west direction. Relatively extensive building structures are inserted into this road network, which can probably be interpreted as residential buildings.⁷

In the northern part of this section, a massive stone setting can be seen running in an east-westerly di-



Fig. 5: Inner city wall, city gate and paved road in Sector F (© Laura Simons, Sirkeli Project, Bern University).

rection, either a large wall or a stone-paved street. In the west, directly on the slope of the adjoining mountain, it links up with one of the longest north-south roads coming from the south. The geoelectric profile through the stone setting shows a massive, deeply founded or high standing wall. This would suggest that it could have been the southern leg of the city wall. However, since its upper end is at the same level as the foundation of the neighbouring house walls, it must have been abandoned when these houses were built. The conspicuously similar level of the upper edge of the massive wall and the lower edge (street level?) of the houses, on the one hand, and the connection to the main road, on the other hand, could indicate that an older city wall used to exist, here. Presumably, this would have been abandoned at a later date, possibly when the Lower Town was extended to the south, its surface then used as a street. The fact that the southern extension of the city was itself protected by fortifications is shown by remains of the city wall running from north to south far beyond the point of the massive stone setting, observable alongside a break-off edge of the terrain of the Lower Town towards the east.

Secondary Citadel

About 250 m south of the citadel mound, a smaller mound is situated. Today it measures approx. 100 m in northwest-southeastern direction and 25 m in northeast-southwest direction and rises about 6 m above the plain. These are only the poor remains of a formerly considerably larger hill, which had been cut into two roughly equal parts by the construction of the “Baghdad Railway” in the late 19th century. The small mound was recognized by J. Garstang⁸ as a “post-Hittite” site, a term he understood as synonymous with post-imperial, Neo-Hittite (Garstang 1937: 54). He reported Hellenistic pottery from this small hill, but without showing any such material (Garstang 1937: 55). M.V. Seton-Williams,

when visiting the site during her Cilician survey, emphasized the purely Iron Age dating of this small mound (Seton-Williams 1954: 168. “Smaller mound, cut by railway, was examined and found to be entirely Iron Age, with painted Geometric sherds, and signs of Iron Age occupation were found up hill to right, overlooking site”). Nowadays, the western third of the mound is completely covered by the debris of the adjacent modern quarry, and is neither visible nor accessible; the central third was completely removed during the construction of the railroad. The top of the remains of the eastern, still pending third is today occupied by the ruin of a modern house, the surface of the hill having been levelled when it was built.

During the 2014 campaign, three small, already existent sections were cleaned, and some ceramic sherds were collected at the eastern edge of the remaining part. The sections themselves were not very informative, since they showed only dump, presumably due to the levelling of the top of the mound during the building of the mentioned modern house. Ceramics dated almost exclusively to the Period NCI and were thus contemporary to the Lower Town. This means that in the 1st millennium BCE, there was an elevated and not particularly small area inside the fortified city in the middle of the Lower Town. Unfortunately, there is no information available yet on the type of occupation and the function of this area. However, it seems likely that an important building was situated there, towering the houses of the Lower Town. Whatever the building was, it gained a distinct accentuation, which, although clearly lagging behind the citadel, was nevertheless likely to indicate a special status. It thus formed a kind of a “Secondary Citadel”, a phenomenon not yet observed at any Cilician or Neo-Hittite site.

Workshop Areas

Until now, no workshop area or workshop installation has been excavated. Nevertheless, some information was gained on their localization by the geophysical prospection and the surface surveys undertaken by the recent project: using geophysics, anomalies could be identified as high-temperature areas, while in the survey material some isolated slags and misfired sherds were discovered surface survey.

All evidence points to the fact that the workshops may have been located mainly in three areas outside the fortified Lower Town, with only a few examples inside of it. First, between the northern edge of the Citadel and the southern riverbank, second, the area east of sector F, and third, the area southeast of the Lower Town. The location outside the city was obviously chosen in respect of the fire hazard and the

odor nuisance which ceramic production, metallurgy and other conceivable fire activities produce. However, future excavations will need to prove that the localizations are correct and clarify if there were any spatial divisions between different industries.

Necropolis and Upper Town

A necropolis is located on the natural hill Bekçi Kullubesi southwest of Sirkeli Höyük and separated from this only by a depression through which the modern road and the railway line run. It was already discovered by B. Hrouda (Hrouda 1998: 431) and briefly examined by the Adana Museum in a rescue excavation in the spring of 2006.⁹ While B. Hrouda dated the graves as “probably Roman”, the Adana Museum reported to have examined a “Hittite”¹⁰ or “Hellenistic”¹¹ cemetery.

While creating a new topographical plan during the campaigns in 2011 and 2012, all graves that were still visible and accessible were measured and noted on this plan. They were either simple stone graves, in which a rectangular burial ground was carved into the natural rock and then sealed with a stone slab, or elaborate chamber tombs, which consist of a dromos and at least one chamber with side-mounted loculi. While all accessible graves were already looted and are now empty, the museum reported the find of one intact and richly equipped grave.

The geophysical prospection and the survey during the campaign of 2018 showed that this area was occupied at least during the NCI period, and was enclosed by the city wall. Moreover, both on the surface as well as through geophysics, walls were detected which did obviously not belong to graves but to architecture. Therefore, in 2019 Sector O was opened, here, to gather information on the occupation kind, its relation to the necropolis, and its precise dating.¹² This excavation brought to light walled rooms, which were deepened into the natural rock and which can be interpreted as a substructure of eroded buildings. They yielded pottery inventories of the NCI period. Close-by, three rock chamber tombs already known from the excavations of Barthel Hrouda have been re-exposed. Although these had already been looted in antiquity, their renewed excavation on a larger scale yielded important new information. It turned out that the necropolis was obviously built inside an older quarry. Clearly recognizable are working traces from the mining of stone blocks. These in turn correspond in their negative format largely to the positive format of the stone blocks used for the city wall. Consequently, the building material for the city wall was extracted, here, before the area was used for the construction of the graves. This in turn would suggest a dating of

the necropolis after the late 10th century BCE. Interestingly, the architecture of the rock tombs corresponds to that of Late Bronze / Early Iron Age tombs from Cyprus. The scattered pottery material dates to the NCI and LCI periods, possibly indicating a first use during the Iron Age and a subsequent occupation during the Hellenistic period. However, this assumption can only be verified by the future uncovering of undisturbed graves. If the Iron Age dating is confirmed, we would have an intramural cemetery, a unique situation in this region.

Suburb

The surveys of M.V. Seton-Williams and B. Hrouda discovered several archaeological sites on the opposite (north) side of the Ceyhan river: In the northeast, below the medieval Yılan Kale, on top of a high peak mountain, a necropolis (Rutishauser 2020, no. 440; Hrouda 1998: 431) and a Bronze Age settlement (Rutishauser 2020, no. 443; Seton-Williams 1954: 173, no. 57) were detected as well as two rather flat but extended mounds southeast of the modern village of Küçük Burhaniye, located on the southern slope of the castle hill (Hrouda 1998, nos. 2 and 3; Rutishauser 2020, nos. 433 and 434). Not far to the west of it, another mound called Kokar Tepesi was registered (Rutishauser 2020, no. 425).

Regarding the urbanism of ancient Sirkeli, the two settlements discovered by Barthel Hrouda on the southeastern outskirts of Küçük Burhaniye are of particular interest, as they extend onto the north bank of the Ceyhan directly opposite Sirkeli Höyük and thus obviously form one cityscape together. First inspection in the year 2011 gave the impression that the two sites are in fact probably just one contiguous settlement area, only subdivided into two parts by the deeply incised bed of a creek. Regular and systematic survey activities, which started in 2016, confirmed this impression (Halama *et al.* 2019: 121–146).

At present, we can reconstruct a 12–14 ha large, relatively flat settlement, which rose northwards and was subdivided by the above-mentioned north-south running creek into an eastern and a western district. According to surface ceramics, it was inhabited during Periods ECI, OCI, MCI, NCI, LCI and the Medieval Ages, while the largest expansion over the entire area was experienced in Periods OCI and NCI, exactly the heyday of expansion at Sirkeli Höyük south of the river. It turns out, therefore, that the occupation history of both places was syn-chronous, and we do not face the situation of alternating settlements.¹³

This raises the question of the function of the area north of the river. The answer may be found in the

geostrategic location of the two places: they lie directly within a narrow passage through the chains of the Misis Mountains, which the Ceyhan had (and still has) to pass. Like the much later medieval castle, from the 4th to the 1st millennia BCE, Sirkeli Höyük controlled this passage, through which the important “Transverse Highway of Kizzuwatna” (Forlanini 2013: 2) went, a trade route running from the Northern Levant through Cilicia and the Taurus up to Anatolia. There was also a ford through the river, here (Seton-Williams 1954: 168), and an ancient bridge might well have existed. The two settlements were not only able to control the fertile hinterland on both river sides but also possible alternative routes passing the north side of the Yılan Kale. Both strategic and economic reasons favoured the existence of a double settlement.

Hence, it can be assumed, for the time being, that both settlements not only had a close functional and spatial relationship to each other, but due to the immediate proximity probably should be considered as one single ancient urban organism. Since the northern part does not seem to have had a citadel at its disposal, it might have been controlled from the southern part. For this reason, the northern part is referred to as a “suburb” for the time being, rather than a satellite settlement.

The existence of a suburb measuring up to 15 ha north of the river greatly increases the ancient settlement area of Sirkeli Höyük. For the cultural NCI level, one can assume a minimum extent of 70 ha.

Overall Picture and Chronological Dynamics

If we now look at the urban development of Sirkeli Höyük on the basis of excavation results, remote sensing, geophysical prospection and survey, we can see an eventful history in which the settlement reached its greatest expansion during the Middle Bronze Age – Period Old Cilician (OCI) (Cilician Chronology Group 2017) – as well as the Iron Age – Period Neo Cilician (NCI) according to the new chronology system (Fig. 6). The ancient settlement of Sirkeli Höyük obviously developed under the protection of a rock spur of the Misis Mountains, and due to permanent settlement activity, continued to grow on the slope of the spur until, by the end of the 2nd millennium BC, it had largely overbuilt it. Extent and character of the site in the 4th and 3rd millennia BCE is unknown, so far, apart from the fact that it already existed. In Period OCI, it shows an enormous extension, then including the area of the Lower Town and the Suburb on the opposite side of the river. It thus seems justified to

label it an urban settle-ment, although many ques-tions about administrative, representative and cult buildings as well as segregation patterns and social hierarchies are still open and must be the subject of future research. In the following Period MCI, a reduc-tion in settlement size can be assumed, since at least in Sector F, no traces of occupation have been attest-ed. However, monumental build-ings now point to specialized functions such as cult activities, which in turn indicate an urban character of the settlement. Sherds discovered in the Upper Town, the northern part of the Lower Town and in the Suburb at least indicate a larger scale of the settlement even then.

The site was still inhabited after the political upheav-als to which Cilicia and almost the entire Near East was subjected at the end of Period MCI around 1200 BCE, as attested by some ceramic assemblages on the Citadel dating to the following Period NCI 1. Hence it seems as if Sirkeli did not suffer in the same way from the vast de-urbanization processes or even aban-donment, which affected many sites in neighbouring regions like the Amuq.

As of Period NCI 2, the settlement regained a particu-larly pronounced urban character with a multipartite fortification system, monumental buildings, social hierarchies and segregation of its inhabitants, sepa-rate industrial zones, etc. The early 10th century saw an extraordinary ur-ban revitalization and, in some aspect, a reconfiguration with the foundation of a new City Wall. Its characteristic features were the bipartite citadel, the Secondary Citadel, the Lower Town, the Upper Town and the Suburb. With an occupied area of 70 ha, the settlement size reached its largest ex-tension since Period OCI. This proves that after about three centuries, the urban crisis, which came about during the 14th or 13th centuries BCE, was finally over-come in the middle of the 10th century BCE. A resus-citation of the urban way of life took place, here, and continued from the 9th through to the 6th century BCE.

Of particular interest is the subdivision of the Citadel, which was created by the difference in elevation and reinforced by a fortification wall. Such bipartite cita-dels have been typical of cities of the “Neo Hittite” culture since the 10th century BCE at latest, as the examples of Šam’al, Kunulua, Karkamiš or Gūzāna demonstrate (Novák 2018: 259–264). The expansive urban development with the foundation of extensive lower towns also finds parallels in the Northern Le-vant and Upper Mesopotamia, as can be seen at Šam’al, Til-Barsip and Gūzāna. The lower towns of these three cities were founded mid or late 10th century BCE, thus corre-sponding to the beginning of our Period NCI 3.

The heyday of Sirkeli Höyük as an urban settlement during Period NCI 3 is not only reflected in its size

and the quality of its architecture, notably the city walls, but also in the regularity of its streets and the obviously standardized layout of the Lower Town dwelling quarters. In the Outer and Inner Citadel, mon-umental stone buildings were erected on top of older buildings; the Secondary Citadel with a hitherto un-known function represented a second visual focal point in the cityscape in addition to the actual citadel.

From Period NCI 4 onwards, a slow decline is evident, although the city continued to prosper. The monu-mental buildings A1 and D1 were abandoned and partly overbuilt by smaller-scaled residential archi-tecture. Although the city wall remained in use and was repaired after a de-struction and possibly kept up to Period NCI 5 or 6, it now showed a less elabo-rate design using a kind of concrete. Overall, howev-er, the city seems to have continued in its given size and structure. Larger destruction horizons are not recognizable in Periods NCI 4–6, so that a largely peaceful development under the rule of the Assyrians, Babylonians and Persians can be assumed. The city was abandoned after period LCI 1, presumably at the time of the estab-lishment of the petty kingdom of Tarcondimotos I.

In some respect, Sirkeli Höyük shows “typical” char-acteristics of “Neo-Hittite” cities, such as the bipartite citadel, and a heavily fortified Lower Town. Other fea-tures, like the Secondary Citadel and the intramural Upper Town as well as the extramural Suburb differ from the typical standard. Their derivation is still ob-scure but might well have its origins in the layout of the settlement during the 2nd millennium BCE. Wheth-er they represent original Cilician elements or were somehow influenced by Central Anatolian, Hittite pat-terns, is one of the most interest-ing questions to be answered by future research.

The complexity of the cityscape and the existence of a fortified citadel alone – protected not only against the outside but also clearly separate from the Lower Town – would indicate a segregation within the urban population. Additionally, extremely large differences in elevation within the settlement significantly strengthen such segregation: contemporary floors of the Inner Citadel (Sector D, Building D1) were at 46.27 m above sea level, of the Outer Citadel on the plateau (Sector A, Building A1) at 30.99 m and in the Lower Town (Sector F) at 18.85 m. Hence, the presumed elite living in the Inner Citadel looked down on residential quarters located 27 meter lower in the Lower Town and benefited from a fresh and cooling west wind in summer. This provides clear evidence of both exist-ence of social segregation within the cityscape and a visual perception of it.

Period	Date	Phenomena	Lower Town	Outer Citadel	Inner Citadel
<i>ECI</i>	2900–2050	Isolated finds in the suburban and lower town and on the citadel; at least one building phase on the citadel; little reliable information due to massive overbuilding			Z XI
<i>OCI</i>	2050–1560	Suburb and Lower Town occupation attested, citadel and plateau seem to be completely occupied		P VII	Z X
<i>MCI 1</i>	1560–1522	Monumental Stone Buildings in the Outer and Inner Citadel			Z IX
<i>MCI 2</i>	1522–1420	Dense occupation on Citadel, few indications for existence of a Lower Town; individual findings in the Upper Zone		↑ P VI	Z VIII
<i>MCI 3</i>	1420–1350				Z VII
<i>MCI 4</i>	1350–1190			↓	
<i>NCI 1</i>	1190–1120		Partial abandonment of Stone Buildings		
<i>NCI 2</i>	1130–950	Stone Buildings partially Foundation of the city and citadel fortification walls	U VI		Z VI
<i>NCI 3</i>	950–720	Largest extension: bipartite citadel, lower town, suburb, upper town (with necropolis?); monumental buildings on citadel; secondary citadel	U V	P V	Z V
			U IV		
<i>NCI 4</i>	720–609	Consistently large urban complex, but abandonment of the Stone Buildings A1 and D1; smaller, domestic buildings	U II	P IV	↑ Z IV
<i>NCI 5</i>	609–539	Reduction of settlement size, abandonment of Lower Town		P III	
<i>NCI 6</i>	539–330				
<i>LCI 1</i>	330–60	Monumental building and domestic architecture on the plateau, otherwise only minor traces of settlement ca. 50 BCE: abandonment of the settlement		P II	Z II
<i>Recent</i>		No settlement activities except railroad station and ceramic manufactory	U I	P I	Z I

Fig. 6: Chart showing the stratigraphies of the various excavation sectors indicating the de-gree of urbanism throughout the occupation periods (© Sirkeli Project, Bern University).

Returning to the above-mentioned criteria defining a “city”, we can now evaluate the urbanism of Iron Age Sirkeli Höyük:

- How big is the settlement? With 70 ha certainly beyond the lower limits of a “city”.
- Is it the centre of a larger hinterland with smaller settlements grouping around the site along an approximately concentric route network? While this was not the topic of the present paper, an analysis by Susanne Rutishauser provides an affirmative answer (Rutishauser 2017: 131–137; 2020).
- Is the location densely occupied? At least on the Citadel, the Lower Town and the Suburb it is.
- Are there monumental, “public” buildings with functions that go beyond ordinary living quarters? As the examples excavated so far in Sectors D, A and E show, yes.

- Are there indications of inner structuring and hierarchization? The complexity of the cityscape and the height differences indicate such.

Therefore, there cannot be any doubt that, during period NCI 3 (ca. 950-720 BCE), Sirkeli Höyük fully met the criteria defined for a city, even if no temples or palaces as such can be identified at the moment.

In terms of its structure, the ancient city had some characteristics that connect it with well-known Neo-Hittite settlements, especially the peripheral, bipartite and fortified citadel and the extensive lower town.

However, there are also urban elements that are unknown in Neo-Hittite urban planning: On the one hand, the intramural Upper Town, which is known from the Hittite capital Hattuşa from the 2nd millennium BCE but not from the Iron Age settlement of this region. On the other hand, the Suburb on the other side of the river, which has so far no equivalent in any contemporary town. It is unclear whether the two

elements are individual phenomena of Sirkeli, which developed already in the 2nd and survived into the 1st millennium BCE, or whether they are distinctive Cilician elements. A definitive decision between the two options cannot be done at present, since there are no parallel features investigated at other Cilician sites. The morphology and topography of the area, however, speak rather in favour of the first option, since both are very specific at Sirkeli and clearly different from those of other known sites such as Soli Höyük, Mersin-Yumuktepe, Tarsus-Gözlükule, Adana Tepebağ, Tatarlı Höyük or Kinet Höyük.

Conclusion

Through the combined application of remote sensing, geophysical prospection, survey and excavations a rather surprising picture of the urban structure of Iron Age Sirkeli Höyük could be obtained. This proves the importance of a combined work strategy for urbanistic research, since nowadays, with only conventional excavation methods, a larger settlement can no longer be adequately explored: While remote sensing can reveal topographical features, geophysical prospection under favourable conditions makes it possible to identify large areas of settlement remains and determine their depth below the surface with relatively little effort. The surface survey offers first clues for the dating of these features. Ultimately, however, several questions remain unanswered, which can only be clarified by excavations. In particular, the function and precise dating of specific buildings can only be answered by analysing the findings related to the exposed architectural remains. Geophysical prospection, remote sensing and archaeological excavations are therefore to be regarded as complementary methods, which in combination lead to far more significant results than conventional methods alone.

In the case of Sirkeli Höyük, the work of the past years could provide important information on the size, structure and dynamics of the Bronze and Iron Age settlement. Besides its extension, the complexity of the site is particularly astonishing. It consisted of very different complexes such as a bipartite citadel, a secondary citadel, a lower and an upper town as well as extramural workshops and a suburb on the opposite side of the river Ceyhan. On the one hand, it can be assumed that Sirkeli Höyük was by no means unique in Cilicia but probably represented a type of city that could also be found in other places; especially the existence of lower towns seems a very likely element of almost all larger settlements in Cilicia. On the other hand, morphology and topography of the landscape in and around Sirkeli Höyük are very specific, making it likely that certain features like the upper town and the suburb could have been very distinctive individual phenom-

na. Most certainly, Iron Age Sirkeli Höyük was obviously an urban settlement with a very complex cityscape.

Notes

- * This article takes up a topic dealt with in Kozal & Novák 2013 and builds on the urbanistic insights gained since then. I would like to thank PD Dr. Annick Payne (Bern) for the correction of the English version of the manuscript.
- 1 An overview of sites and excavations in Cilicia, accompanied by a comprehensive bibliography, is given by the Cilician Chronology Group 2017.
- 2 The remote sensing and detailed topographic survey were carried out by Dr. Susanne Rutishauser (Bern), initially in collaboration with Ralph Rosenbauer M.A. (Bern): Rutishauser 2017; R. Rosenbauer & S. Rutishauser in Novák *et al.* 2019: 27–32; 46–52. For the methodology, see also Sollee *et al.* 2018.
- 3 <https://earthexplorer.usgs.gov/> (18.04.2018). The CORONA Atlas of the Middle East offers an extensive, freely available collection of digitized image strips <http://corona.cast.uark.edu/> (27.04.2018).
- 4 TanDEM-X is an acronym for TerraSAR-X add-on for Digital Elevation Measurement. TanDEM-X is an extension of the TerraSAR-X mission of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR), the TanDEM-X satellite was launched in 2010. Both satellites fly at an orbital altitude of 514 km, only a few hundred metres apart, in close formation, which allows the simultaneous recording of the terrain from two different viewing angles and thus generates data with precise altitude information with a vertical accuracy of up to < 2 m. See <http://www.dlr.de/tandemx> (30.04.2018). As part of an interdisciplinary research project, a team from the Universities of Bern (Mirko Novák, Ralph Rosenbauer, Susanne Rutishauser) and Göttingen (Stefan Erasmí) evaluated data from the TanDEM-X project.
- 5 Geophysical prospections in Sirkeli Höyük were carried out in 1994 and 2007 by Helmut Becker (Munich) and since 2008 by Christian Hübner, Stefan Giese and Birthe Hemeier from the company GGH solutions in GeoSciences (Freiburg). Individual measurements were made by students of the University of Bern under the supervision of Ralph Rosenbauer. See Chr. Hübner and B. Hemeier in Novák *et al.* 2019: 53–60; Sollee *et al.* 2018.
- 6 These investigations were conducted as a sub-project under the direction of Dr. Alexander Sollee (Bern/Munich).
- 7 The geophysical prospection was conducted by Christian Hübner and Stefan Giese in 2017 and 2018. The results were analysed by Joëlle Heim in the frame of a qualification thesis at the University of Bern and will be published in the next volume of the Sirkeli publications in *Schriften zur Vorderasiatischen Archäologie*.
- 8 See on map of Sirkeli Höyük at Garstang 1938, Tab. 14 right down “Post-Hittite Mound”, showing only the northern part. The railroad cuts the mound in two.
- 9 The soundings were directed by Kazım Tosun, then director of Adana Museum. Turkish media re-ported frequently about the results, but a scientific publication never appeared.
- 10 See Turkish Daily News from 14th June 2006 (<http://www.turkishdailynews.com.tr/article.php?enewsid=46064>), which was distributed via Agade Mailing List on 25th June 2006.
- 11 Haberler.com from 12th June 2006.
- 12 This work was done as a sub-project under the direction of Dr. Alexander Sollee (Bern/Munich) and will be published in more detail in future.
- 13 Other examples of alternating settlements include e.g. Tall Tayinat and Alalah: The former was inhabited in the 3rd and 1st millennia BCE, the latter in the 2nd.

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