Medieval Town Structures of Arsur on the Basis of Non-Invasive Methods

Results of a German-Israeli Project Collaboration

By Hauke Kenzler

1. Short History of the Site

Some 15 km north of the centre of Tel Aviv/Jaffa lays the desolate Crusader period town of Arsur on a cliff above the sea (Fig. 1). Only a few visible relics indicate the long history of the place already settled during Persian times. Although the town was known under several names – e.g. Apollonia (Hellenistic-Roman), Sozousa (Byzantine), Arṣaf or Arṣuf (Islamic) – the Frankish name-form Arsur¹ shall be used in this paper, due to its chronological alignment. When the Franks took the town in 1101, the historical connections were obviously unknown to them, as they repeatedly conflated Arsur with the classical Antipatris, Azotus or Dor².

In 1265 Arsur and the northerly neighbouring castle were captured and destroyed by the Mamluk Sultan Baibars I³. As a consequence the area remained permanently desolate and only Bedouins camped there occasionally until modern times. Only to the south close to the burial site of ‘Ali ibn ‘Alim, a holy man who died at the end of the 11th cent., did a mosque with small settlement develop⁴. The inhabitants of this village, called El-Haram or Arṣuf, had utilized the town’s ruins as a source for building materials for many years. During the time of the British Mandate the continuing stone robbing was precisely recorded. In the village itself columns and spolia had been visibly reused, before its complete destruction in 1948.

In 1950 a munitions factory was built on the eastern part of the deserted town and its near surrounding. Because of the buildings and underground tanks erected there, but particularly by moving great quantities of earth to create defensive banks, an open sewer and the levelling of large areas, great parts of the archaeological record were destroyed unseen.

In the year 2001 the archaeological park Apollonia/Arṣuf opened, which includes the better preserved western town part near the sea and the castle. At the same time the military factory was closed down and dismantled. Although this area is still not open to the public, the access for archaeological surveys was possible. For the near future the valorisation of the eastern part of the site and its inclusion into the archaeological park are planned. Thus a further destruction of the archaeological heritage seems averted.

¹ See Galor/Roll/Tal 2009; Tal (ed.) 2011; Roll 1996.
² Beyer 1951, 155; Benvenisti 1970, 130.
⁴ Taragan 2004.
2. New Research in Context

For a long time the town has hardly merited consideration from archaeological or historical side, mainly because it had no significant building ruins and is not mentioned in the Bible. And yet the place achieved some fame through the battle of Arṣūf, a turning-point in the third Crusade.

The regular inspections during the Mandate period remained the only archaeological activity. Leastwise an on-site measurement of the town with its defences and other visible structures was conducted during the Survey of Western Palestine (SWP) in 1874 (Fig. 2).

---

5 The reports are in the Rockefeller Museum in Jerusalem.
6 CONDER/KITCHENER 1882, 137.
Fig. 2. Plan of Arsūr, surveyed on the 4th of May 1874 (after Conder/Kitchener 1882, 137).
Modern archaeological work started with salvage excavations in connection with the munitions factory in the 1950s, in the beginning by the Israel Department of Antiquities (after 1990, the Israel Antiquities Authority), and since 1982 by the Institute of Archaeology of Tel Aviv University. The initial research questions focused exclusively on the Roman and Byzantine period and only came to the medieval features within the town wall at a later time. In 1977 a number of small buildings, which were interpreted as the Early Islamic market-street, were excavated. First research excavations in the 1980s concentrated on areas along the southern and western town wall, where some Crusader period houses were registered as well. The castle became the main focus of examination, especially from 1998 to 2000 and 2009 to 2012. But only about 6% of the ca. 6.7ha area of the medieval town, excluding the later incorporated castle, have been archaeologically excavated.

Since May 2012 the Crusader period town is the focus of a joint research project of the universities of Tübingen and Tel Aviv. The German Research Foundation (Deutsche Forschungsgemeinschaft: DFG) funding for the project titled: “The Crusader Town of Apolloonia/Arsur in Israel. Structures – Cultural Adaption – Town-Hinterland Relations” was granted until 2016.

In view of earlier fragmented research in Arsur it was a foregone conclusion that no individual, isolated excavations should be conducted, but the structures of the entire town should be put central stage. When the project started some of the most important characteristics of the town were largely unknown. So were the course of streets, the density and orientation of buildings, the possible development of artisan quarters or the formation of socially deprived or favoured quarters, as well as the location of the cemetery and the church. To the east, the entire topography of the settled mound had been permanently changed by the erection of the munitions factory, not even the course of the town wall was clarified unequivocally.

Therefore, a two-tiered approach was chosen: To begin, suitable non-invasive methods needed to give an overview on topography and layout of the medieval town area and its closer environs, which should be as accurate as possible. The more costly and time consuming excavations were to deliver data, which can only be won by a detailed examination of smaller areas, in a targeted second step. Choosing the excavation areas was to be dependent on the results of the previous prospection. At the same time, the subsequent excavations would be used to verify the results of this prospection.

At the beginning of the collaborative project different methods from different disciplines were discussed and examined as to their chances to obtain most information about the complete town area without digging. The best techniques with respect to costs, time duration, soil conditions, vegetation and modern disturbances were chosen. Finally a bundle of methods, namely remote sensing (aerial photography, LiDAR, satellite), geophysics (geomagnetometry, ground penetrating radar), conventional historical landscape analysis (written sources, historical photographs and site-plans) and the evaluation of older archaeological surveys, could be applied. Because of the dense vegetation the systematic collection of surface finds was not possible.

---

7 ROLL 1996.
8 ROLL 2008.
9 AYALON/TAL/YEHUDA 2013.
11 The project is led by Prof. i.R. Dr. Dr. h.c. BARBARA SCHOLKMAN and Prof. OREN TAL Ph.D.
Following is the summarized review of these methods and their results. The example of Arsur shows how important a comprehensive look at the complete settlement is, before archaeological excavations should start. Archaeology in Israel is traditionally extremely focussed on excavations, carried out by a large number of different national and foreign institutions. So an approach, which prevents the archaeological heritage from damage, is still unusual.

In addition to the multitude of tested methods, through which the investigations in Arsur gain more than regional significance, their application to two areas of different vegetation and archaeological preservation is particularly interesting.

3. Remote Sensing

3.1. Aerial Photography

Because of the rapid and dramatic changes of the landscape in Israel after the Second World War, the potential value of historical aerial photographs has long been known. But like other countries in the Middle East, much early imagery is still held by the former colonial power. It is difficult to gain access to many archives and collections are split between countries.

For Israel the pictures of the Bavarian Flight Division 304, which photo-documented large parts of Palestine in 1917 and 1918, still are of great significance today. Nearly 3000 pictures are archived in the Bildsammlung Palästina in the Bavarian State Archive in Munich and can be accessed online. Additional imagery, which was confiscated by the Allied Forces, is online on the internet pages of the Aerial Photographic Archive for Archaeology in the Middle East (APAAME). Not only pictures of important areas and military targets were taken to assemble maps, but also ruins and religious sites. Unfortunately only a quite slanted image of Arsur, taken from a great height on the 12/29/1917, exists (signature: BayHSiA, BS-Palästina 20), but it shows no details of the deserted settlement.

Of better use are the photos taken by the Royal Air Force during the Second World War, which can be found at the National Collection of Aerial Photography in Edinburgh. A number of photos of Arsur were taken between 1944 and 1946 at different seasons from a great height (Taf. 16). These are the last photos showing the town area before the destructions by the military factory. Thus for example the entire length of the eastern town wall and the foundation of a large building behind the eastern gate can be seen. This circumstance is even more important, because these walls were never documented properly on the ground.

The Royal Air Force took photos from a position nearly perpendicular to the ground. They are therefore hardly slanted and can, with only a few corrections, be transformed into a scaled ground plan map. A further advantage to the older photos is that two overlapping pictures were taken, which allow a stereoscopic interpretation. With basic means therefore a spatial impression of the deserted town before the deleterious earth movements in the 1950s can be won. Indeed, with the help of photogrammetric image exploitation lengths and heights

---

13 See BEWLEY/KENNEDY 2013, 222.
16 Signature: BayHSiA, BS-Palästina 20.
17 http://ncap.org.uk – unfortunately no online research on Palestine is possible.
within the deserted town can actually be taken. Theoretically it should also be possible to create a terrain model of the deserted town using digital photogrammetry. Unfortunately, even though different companies and universities did a trial run with specially obtained scans of the original photos, this was not successful. The pictures of Arsur have too little contrast within the town area and were taken from too high to have the necessary ground resolution. This is especially unfortunate as no height levels were recorded before the building of the munitions factory.

At least the analogue use of the stereoscope revealed some interesting aspects of the original topography (Taf. 16). According to that, the town moat, which on the map of 1874 runs the entire length of the town, was already backfilled in the east. The area within the deserted town was used as a pasture ground, the area outside partly as fields. The run of the wall was still visible in most parts, if not as complete as 70 years before. The area of the town was, similar to a tell, slightly upraised in relation to the surroundings. Only right towards the east of the castle no difference in levels between town and environs could be detected.

Within the walled area level differences may give conclusions on topographic development. Thus the highest point lay next to the still existing southwest corner of the town wall and even towers over the position of the castle. The centre of town formed a large, relatively flat area. To the north this ended with a slight incline towards a lower level, just where the town wall delineates in a strange kink, to then run in front of the castle in a nearly straight, slightly convex turn. Right on the slight incline a number of east—west oriented wall remnants can be recognized. So the postulation was formed, that these belonged to an older settlement phase marking a first medieval town fortification. This idea will be readdressed below, when the other survey methods are discussed.

Other terrain structures were too indifferent or the quality of the photos was insufficient for a closer response. Thus finding a British aerial photograph from 1923, unknown until then, was especially lucky. During archive and museum visits for the research on the town-hinterland-relations, which form another part of the DFG project, the hitherto unknown photo was discovered in the Rockefeller Museum. The high resolution photo was shot from a nearly perpendicular position and shows about 4/5 of the town area (Taf. 17). The quality is much better than those from the Second World War. Especially obvious are the British trenches and emplacements from 1918, the course of which was previously unknown. To reconstruct the medieval town plan many walls are of interest, which became for the first time visible here in good quality before their undocumented loss. Also visible are the eastern town wall and the building behind the gate, which was already known from other historical aerial photographs and the SWP map from 1874. Further smaller building remains are situated near the centre of the settlement and the north—eastern town wall opposite the castle. These structures do not appear on the SWP map, as do not the possible remains of an older fortification phase already identified on the photos from the Second World War (see Fig. 2).

19 E.g. by the erdas-software: http://erdas.grid-it.at/software/lps (access: 10/11/2016).
20 The Director of Antiquities allowed the leasing of the site on the 14th of August 1941 to villagers of El-Haram in order to grow cereal crops or vegetables. The planting of trees or the erection of buildings was not permitted (Mandate Period file of Arsur in the Rockefeller Museum).
21 By now the Mandate Period file of Arsur is online on the website of the Israel Antiquities Authority archives: http://www.iaa-archives.org.il/ShowFolder.aspx?id=7639&loc_id=3036&type_id=5%2c20%2c6%2c7%2c8 (access: 10/11/2016).
22 One of the smaller emplacements could be excavated 2013 in area U.
The 1923 image alone has therefore enhanced our insight into the medieval town significantly. The grazing of the town area caused the good visibility of the walls, which – in contrast to today – prevented the low brushes and shrub-like plants from growing. A straight pathway running from south to north through the middle of the deserted town is clearly discernable and some straight lines, according to other Mediterranean sites, have to be interpreted as field borders. Furthermore cropmarks in darker and lighter discoloration are visible, which may indicate archaeological structures underneath.

The aerial photo from 1923 could be rectified and georeferenced without any problems and laid over the actual airborne laser scan. In this way the run of the town wall was pinpointed exactly on the ground. The re-measurement using a total station on-site showed that the town wall and the ditch located in front are probably still mostly preserved in the eastern part of the medieval town, but are hidden under massive levelling. They were traced later by geophysical methods.

3.2. Airborne Laser Scanning

At the start of the collaborative project no complete digitalized site plan existed. The latest archaeological plan of the town did show the archaeological trenches and several walls, but proved to be rather inaccurate when examined more closely. Thus the archaeological grid, mostly measured in by hand and often using local coordinates, had not been surveyed exactly into the area. Especially the east of the deserted town had been depicted very sketchily. So for example the course of the Crusader period town wall was only added approximately on the basis of the 1874 map. Contour lines or other terrain structures were not recorded at all in the east. The plan furthermore still used old Israeli coordinates, even though the country had changed to the Israeli Traverse Mercator in 1994.

As an accurate area plan was indispensable for knowledge of the settlement structures, it had to be created at the project beginning. In order to do this modern survey equipment needed to be used for quite practicable reasons. For one reason time and manpower needed to be conserved during the essential area survey, for another any data basis for the east but also for the surrounding country was missing. By producing a digital terrain model the localization of all the still extant walls was supposed to be made possible, as well as serving as a basis for an overall CAD plan. Additionally the visible walls to the west of the deserted town and the castle were to be surveyed in on the ground with a total station.

For the past 15 years, Airborne Laser Scanning (ALS) or Light Detection and Ranging (LiDAR) has been used for archaeological purposes with great success. By sending out extremely short light pulses in quick succession even forests and bushlands can be penetrated and the shape of the terrain or the surface depicted, so that the technique has become very popular for heritage management in forested regions. Also the short time needed to measure large areas at a high exactitude is a big advantage.

In Israel this technique is hardly utilized for archaeological questions. Like most other countries in the Middle East aerial reconnaissance is seldom allowed for archaeology. It

---

23 Turner/Crow 2010.
24 See chapter 3.2.
25 See chapter 4.
26 Galor/Roll/Tal 2009, 4; Tal (ed.) 2011, fig. 1.
28 See Bewley/Kennedy 2013, 240.

ZDPV 132 (2016) 2
was therefore fortuitous that the firm SEE Advanced Mapping Systems and Solutions Ltd had done a scan of the coastal strip shortly before our project began. The goal was to monitor erosion, particularly along the steep cliffs of the country. The purchased data is a 550m wide strip, which contains the whole Crusader period town area, with a resolution of four mapping points per square meter. The exactness of this measurement surpasses many terrain models used at the moment in European archaeology. Furthermore the hinterland up to a distance of 1200m from the coast was surveyed with one measuring point per square metre.

In the digital elevation models (dtm) (Taf. 18 and 19) the earth movements due to the building of the factory are revealed in their entirety. In some places great embankments were piled, in other areas the level had sunken significantly. To the north a large and deep ditch was created running towards the sea, which destroyed parts of the town fortification. Not visible are the destructions underground through pipes, tanks and cellars. To the west, in the still undisturbed area behind a broad driveway outside of the factory, there are in contrast some interesting surface observations to be made. But the hope that smaller surface features might give hints of the underlying features was not fulfilled, and after the building activities to make the National Park wheelchair accessible in the spring of 2014 it is no longer possible to check these on the ground\textsuperscript{29}. Footways, old excavation trenches, erosion lines, old field marges and the shape of the steep cliff with the beach in front are however exactly depicted. Thus the beach has become smaller since 1923, the cliff has broken down in various places and the erosion lines have become deeper. Below the castle, where the breakages are most prominent, the bottom of the cliff was fixed with large stones a few years ago to create a breakwater.

The digital surface model (dsm) (Taf. 18) shows how broad shrubs and low trees have reclaimed the abandoned factory. Archaeological work and especially geophysical measurements\textsuperscript{30} are considerably hindered and in some cases completely prevented. The low bushes in the park on the other hand skew the topographic situation only slightly. Above all the walls excavated in earlier campaigns are plain to be seen. Therefore a reliable master plan could be prepared. An intermediate result has already been published\textsuperscript{31}.

3.3. Satellite Data

Great hopes were set on the Corona satellite imagery, which was not accessible at the beginning of current project about town and hinterland of Arsur. The American spy satellites were especially used above the Middle East from 1959 until 1972, and their pictures give us valuable information where no historical photos of proper resolution exist\textsuperscript{32}. When the photos were finally online in February 2012\textsuperscript{33}, it became apparent that they had a significantly lower quality than conventional aerial photos of Arsur. Moreover, the process of generating eleva-
tion data from the Corona pictures proved especially complicated and inaccurate. The low contrast made the three dimensional rendering of fine detail unfeasible. However, the Corona pictures do serve very well for the inspection of archaeological features in the environs of Arsur, as many structures have been lost since the 1970s.

The data of the Japanese ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) Sensor, which has been running on the American Terra-Satellites since 1999, allows the generation of terrain models for a large part of the earth’s surface. The advantage lies in the open access for research purposes, the comparatively good resolution of 30 m and the consistency of the data set. For the evolution of the bygone Crusader period dominion, an area of about 300 sq km, which is also a crucial part in the DFG project, the data is of great help. Among others it gives hints to the consistency of the terrain or the course of old roads.

4. Geophysics

4.1. Geomagnetic Survey

In May 2012, before excavations began, the German firm Terrana Geophysik from Mönningen, who has much experience in the archaeological sector, conducted geomagnetic surveys. The results, after prompt evaluation, were used as the basis for the first excavation campaign in the summer of the same year. The method was used because under favourable condition large areas can be surveyed in a short time. The older excavations have already shown that through the entire medieval period stone was used for building, so that the buildings were supposed to be seen on the survey plan. Furthermore, the penetration depth of 1 to 1.5 m would assure that the picture would mostly depict the last building phase before the destruction by the Mameluks.

In a geomagnetic prospection artificial changes in the magnetic field are measured and used as indicators of human activities. In this case a Fluxgate Gradiometer with four probes was used. Normally areas of \(40 \times 40\) m in a grid of \(0.125 \times 0.5\) m, meaning 16 individual measuring points per square meter, are recorded (Taf. 20A). While in the undisturbed west of the deserted town such large areas were easily measured, the eastern part was often densely grown with bushes. Accordingly only the record of smaller part-areas was possible here. In addition the meter-high embankments had to be contended with. In the end, an area of 2.9 ha was surveyed, which corresponds to the accessible area within the Crusader period town. The grid points of the survey were measured by total station and transferred into the master plan. The survey data was processed and transformed to a two-dimensional depiction, a so-called magnetogram (Taf. 19 and Fig. 3). A few introductory notes are necessary for its interpretation:

- Ferrous objects on the surface or in the ground generate – depending on their size – a strong dipole-anomaly of tens to thousands of Nanotesla (nT) field strength with a maximum in the south and a minimum in the north. Archaeological structures such as walls, backfilled pits or ditches on the other hand normally produce only very slight anomalies of a few Nanotesla.

---

34 http://www.gdem.aster.ersdac.or.jp (data downloaded on 02/09/2012).
In general positive anomalies (dark grey to black in the display) depending on breadth, structure and size point to backfilled pits, ditches, gullies or former high temperature areas (hearth, ovens, burnt screed, charcoal, etc.). Negative anomalies (light grey to white in the display) normally correlate to stone packings or remains of wall foundations in the ground. Former buildings are typically identifiable because of their rectangular shape.

But anomalies can also be the result of variations in the composition of the ground or geological structures. Furthermore anomalies in the magnetic field are caused by modern deposits such as fire pits, backfills and paths, as well as drainage and wire pipes. If such anomalies appear often, then the interpretation of magnetograms is made difficult to impossible. In the end only targeted archaeological excavations can show without doubt what the detected anomalies actually are.

Ultimately the magnetograms of Arsur show many, sometimes extensively disturbed areas caused by modern ferrous objects affecting magnetism in the ground. Especially in the castle, in the former munitions factory, as well as in the area of the outer fence of the factory and the broad road in front of it the disturbances cover up the possible presence of weaker structures of archaeological objects in the ground. Therefore an interpretation of these areas is not possible. Below only the huge contiguous area between factory and steep cliff (site 1) and the smaller long and thin area south of the castle (site 2) are considered.

In the south of site 1, near to the excavated Crusader period town wall, a number of negative straight anomalies can clearly be seen (area A, Fig. 3). In all probability these are walls. As a rectangular pattern can be discerned between the three and ten meters long structures, they are probably dense small-roomed buildings. Between them lie different weak positive anomalies, probably backfilled pits or other features of unknown usage. In the centre of site 1 (area B) there are also negative straight anomalies, which are accompanied by extensive weaker positive anomalies. The probable walls can be followed for a length of about 25 m, so that they most likely represent more generous, open-plan buildings. Further to the north of site 1 (area C) there are smaller, three to four meter large, roundish positive anomalies, which can most probably be addressed as kilns. As hardly any other features were to be seen in this area, it is most likely to have been a commercial area.\textsuperscript{36} In site 2 (area D) eight regularly arranged circular positive anomalies stand out. Due to their strength and the missing negative parts they are non-typical for ferrous objects and probably archaeologically significant. Their interpretation must remain open. They are possibly related to a vault documented in 1874, as they refer to it in terms of position and orientation. Anticipating the results from the ground penetrating radar examination, it must be pointed out that these features are merely shallow. They are therefore possibly modern.

\textsuperscript{36} The later excavations from 2012 to 2014 in the geomagnetic survey areas A, B and C proved the interpretations to have been correct.
Fig. 3. Magnetogram of site 1 and 2 (± 20 nT); for the location see Taf. 19; the areas with clear archaeological features are labeled; notice the large disturbances in the east of site 1, caused by the factory fence and a lighted driveway (Terrana Geophysik).
4.2. Ground Penetrating Radar

In the spring of 2014 a second more elaborate geophysical survey method was tested. With a ground penetrating radar (GPR) smaller area measurements were supposed to be taken in a few chosen spots, from which more detailed information on the archaeological features in the ground could be gleaned. The most important survey areas were in the eastern part of the settlement, where neither surface observations nor geomagnetic surveys had been used with any success. The goal was to find the Crusader period town wall and a possible divergently running earlier development. The questions had evolved during the project’s run-time and depended mainly on the correlation of the 1874 plan with the historical aerial photographs.

GPR examines the ground with the help of electromagnetic radiation. Electromagnetic waves in impulse form are transmitted via antennae into the ground. From the receiver they disperse at a specific speed. The waves are reflected by discontinuities, such as buried objects or archaeological structures, and the returning signals are recorded (Taf. 20B). By measuring the interval between sending and receiving, depth and breadth of the object in the ground can be perceived. The measured sections are depicted in so-called radargrams. In a second step these radargrams are passed on to a plane surface depiction. Relevant to the exactness is therefore the closeness of the measuring lines. In distinction to the geomagnetic survey iron objects in the ground or on the surface have no impact on the results.

Within the town expanse seven areas of varying size could be examined (Taf. 19). They are scattered across the entire area of the deserted town. In the spring of 2014, a favourable situation was encountered due to the construction of wheelchair accessible paths within the national park, during which dense vegetation and older spoil and debris heaps had been removed. The measuring device is dependent on flat, even surfaces. For this reason the location of the already mentioned building behind the eastern town gate could, for example, not be surveyed as it was planned. The dense oleander shrubs there were not allowed to be removed.

The sections measured in the survey were only 0.33m apart, therefore were dense in terms of the area. The measurement frequency lay by 3cm, the depth of penetration by 2 – 2.5m. In all a section length of 5km was measured.

Especially good and interpretable results were found in the east of the town, where the town wall with the peculiar kink was visible until 1950 (Taf. 19, site a and Fig. 4). The town fortification could be confidently located in this place at a depth of 1m. The feature did not vary more than 1m from the location based on the rectified aerial photos and SWP plan. So in this case the preservation of the Crusader period town wall, despite the overbuilding by the factory, is verified. Possible extensions of the town wall to the west or south, as would have to be expected if the town had expanded to the north or east, could not be proved. However, certainty on this question can only be obtained by an excavation.

Further north, opposite the castle, the town wall could not even be found at the maximum penetration depth of 2.5m (Taf. 19, site b). Here, it has either been robbed out or covered by a hefty levelling. A comparison of altitudes with the remains of a preserved wall part further to the north and the modern surface level suggests the latter. Thus the wall superﬁcies are to be thought at a depth of 6 to 7m.

---

37 These measurements again were conducted by Terrana.
The results of the other surveyed areas cannot be showcased here, as their interpretation would cover too much room. Here the careful assessment after a comparison with the results from all other methods, particularly the excavations, is needed.
5. Historical Research

The written sources are only considered here, insofar as they give clues to the topography and the construction of the town. All reports and documents in Latin and Arabic language are already edited and have been available to researchers for more than 100 years. So this chapter only sets out to compile the well known facts into a new summary tailored to the subject.

After the Islamic conquest Arsūf was, as we know from Al-Muqaddasī in the year 985, the chief town of a military administrative district (kura or kūwar). The name ṭibāʿ according to Al-Muqaddasī is associated with a garrison protecting the coast. It encamped in a fort and staffed a system of watchtowers. Al-Muqaddasī adds that the town at his time was smaller than Jaffa but fortified and densely populated. After two futile tries an army under Baldwin I managed to take the town in 1101. The victory was made possible with the assistance of a Genoese fleet. The king had promised his helpers a third of the plunder and quarters in the conquered Arsur. After the defenders had surrendered, as Ibn al-Athir reports, they were allowed to leave unhindered for Ascalon, so that the town was completely empty of Muslim populace. The same fate probably awaited the resident Samaritans. Thus we can postulate that the town was only slowly repopulated after the conquest, whereby the Christian populace represented the biggest proportion. The town fortifications were renewed by the Franks and a garrison left there. In the middle of the 12th cent. Al-Samʿani explicitly mentions holy men and Sufis in Arsur, so that the town was again accessible to Muslims.

In spite of its small size Arsur is mentioned frequently after the Christian appropriation, due to its convenient location, small landing place, its excellent forests, and pastures. Baibars set up camp here as early as 1269 due to the rich pasture grounds. The SWP map X, drawn in the 1870s, still shows the remains of an oak forest right northeast of Arsur, which grew behind the coastal dunes on the sandy but dry hamra soils. The surrounding, lower land of the Sharon flat was a flood risk, and without artificial drainage agriculture was hardly profitable. The forest of Arsur is also mentioned in Latin and Arab sources about the battle of 1191, as the Crusader army expected an ambush from there. As Saladin withdrew after the battle to a hill where the forest began, the vegetation changed according to the environmental situation from the coastal parallel line of older kurkar cliffs with sand dunes to the forest land on the hamra soil. The forest is also shown on a Palestine map dating to the first half of the 13th cent. and served Baibars in 1265 in his preparations for his attack as a pretence that he was only going on a lion hunt.

---

40 BEYER 1951, 154.
41 Fulch II, c. 8.
42 RÖHRICH 1898, 20; ROLL 1996, 601.
45 TARAGAN 2004, 86.
46 See BEYER 1951, 155, n. 27.
47 THORAU 1992, 196.
48 RICHARDS 2001, 172; RÖHRICH 1898, 585.
49 RICHARDS 2001, 175.
50 RÖHRICH 1895, plate VI. See also http://frenchofoutremer.com/omeka/exhibits/show/oxford-outremer-map (access: 10/11/2016). The map is ascribed to the Benediktine monk Matthew Paris.
51 LYONS/LYONS 1971, no. 84.
End of August 1187 Arsur was conquered by Saladin. So that his enemies would have no base he ordered the fortifications destroyed in the summer of 1190. The inhabitants were compelled to move to Beirut, which at the time was in Saladin’s hands. The thus empty town fell back to the Franks on the 8th September 1191. In connection to the fighting the only mention of the inner development is made: the highly respected knight Jacque de Avesnes, fallen in battle, was buried the next day in the church of Mary in Arsur. The quick taking of the town and the quick reconsecration – not reported for Arsur but absolutely necessary – of the church, clearly built before 1187, can only be explained by the earlier destruction of the fortifications and the exodus of the Muslim inhabitants. The church was obviously not destroyed, possibly because it had served as a mosque in the meantime. The Crusader army camped in front of the town for just one day to recover from the fighting before they moved on. They set up their camp in the south of the town, not within the obviously not suitable town area. No reference is made to a garrison left behind, which indicates that Arsur did not have any strategic value at the time. Noteworthy for the topography is that the battle broke out as the Christians, coming from the north, had just reached the gardens of the town.

In previous research it has not been addressed that Arsur needed a very long time to grow back into its former importance after the Christian reconquest. The expulsion of the Christian inhabitants and the frequent change in ownership surely played a part. Two reports by pilgrims, written more than 20 years after the battle, seem to have been missed by most researchers. Wildbrand of Oldenburg saw Arsur in 1212 and reported: “Ab illa magno timore transiimus Arsim, que est civitas parua et destructa tempore treugarum a nostris inhabitata, multos in finibus suis habens latrunculos sarracenas”. The recent translation by PRINGLE reads: “From there in great fear we passed by Arsur, which is a small destroyed city, inhabited by our people at the time of truces and having Saracen robbers within its borders”.

This situation had not changed in 1217, when Magister Thietmar passed the town: “Postea a Cesarea Palestina veni Assur, quondam civitatem famosam, modo fere desolatam. Ubi aliquando milites famosisimi et optimi totius terre extiterunt” In PRINGLE’s translation: “Then from Caesarea I came to Arsur, formerly a renowned city but now almost desolate. From it at one time came forth the most renowned and finest knights of all the land”.

Furthermore, many sources indicate the overall uncertainties of pilgrim travels. Particularly in Rochetaille, an artificial mountain break at the estuary of the Nahar el-Fāliq/Nahal Poleg north of Arsur robbers attacked travellers. Fitting with this picture is the fact that the already mentioned map of Palestine from the first half of the 13th cent. calls Arsur casafe.

52 ROHRICH 1898, 520.
54 RICHARDS 2001, 176.
56 See BEYER 1951, 156–158.
57 LAURENT (ed.) 1864, 184.
58 PRINGLE 2012, 86.
59 For Arsim read Arsur; the identification is unambiguous due to the travel route; BEYER 1951, n. 52; LAURENT (ed.) 1864, n. 200.
60 KOPFITZ (ed.) 2011, 146.
62 CONDER/KITCHENER 1882, 133.
63 BEYER 1951, 158.
while for example Caesarea is named *civitates* and more strongly fortified places such as Chastel Pèlerin (*Atlit*) are called *castellum*. 

Only under John II of Ibelin, who took over the governance in 1236 and died probably before 1260, did the town regain strength. In 1241 he renewed at least the fortifications of the castle. Possibly the source refers to the fortifications of the entire town. This would be the second Crusader period fortification phase which is handed down in written sources. In 1255 John II was able to secure the peace in the lordship of Arsûr in a treaty with the Muslims. Afterwards the signs changed for the worse. His son Balian of Ibelin sold the right of ownership to the “*castellum, civitas et dominium*” Arsûr in 1261 for a yearly rent to the Hospitallers. Towards the end of the Crusader kingdom of Jerusalem, the military orders bought many properties, which came under Muslim pressure, and tried to strengthen the defence system.

Straight after the takeover of Arsûr the Hospitallers implemented a third recorded Crusader period rebuilding phase. This is obvious from an exchange of letters between Baibars and Hugh Revel, the grand master of the Order, in 1263. In violation of an earlier agreement the Hospitallers had developed the fortifications of the town. Reuven Amitai refers to Ibn ‘Abd al-Zâhir, who reports that the Hospitallers had built a suburb (*rabad*). Šâfi‘ ibn ‘Ali on the other hand writes that they had built a wall around the suburb, which seems more reasonable. Archaeologically such an expansion or suburb can well be brought into line with the settlement portion east of the castle. Because of the strange kink in the course of the wall, it was already assumed that this town quarter was fortified later. Also the explanation given by Hugh Revel on the fortification as the protection of the needy is pre-eminently sensible if before there existed an unfortified settlement.

The town was conquered on the 26th of April 1265 by Baibars after a 40-day siege and shortly afterwards on the 29th of April the castle. Baibars then ordered its utter destruction and depopulation, as Ibn al-Furat reports extensively. Arsûr never recovered from this destruction, so that Abû al-Fida‘ saw it lying in ruins and unpopulated in 1321. The traveller Burchard, who visited Arsûr in 1283, calls it a village. Here the small settlement near the Sâiydina ‘Ali mosque is meant, which existed until 1948 and became known as *Arsûf* or El-Ḥaram on the maps.

6. Picture Collections

It has already been pointed out that Arsûr, in contrast to other sites in Palestine, has courted relatively little attention. This is true for professional archaeologists, interested laypeople and all other forms of interested or religiously motivated travellers in the Holy Land. The place is

---

64 RÖHRICH 1895, plate VI.
65 RAYNAUD (*ed.*) 1887, 124, no. 220.
66 See BENVENISTI 1970, 132; BEYER 1951, 158.
67 LYONS/LYONS 1971, no. 49.
68 RRH no. 1302, 1313, 1371.
69 AMITAI 2005, 68 n. 29.
70 AMITAI 2005, 77; LYONS/LYONS 1971, no. 64.
71 AMITAI 2005, 77; LYONS/LYONS 1971, no. 91.
72 See BEYER 1951, 158.
73 Cf. BENVENISTI 1970, 133.
not mentioned in the Bible and the above-ground ruins do not impress as compared to other archaeological sites.

This means that only a few reports or photos from the 19th and early 20th cent. exist. Only the castle and the landscape directly in front of the steep cliff aroused some interest in visitors. As just these areas were spared by the 1950s factory building, the pictures hardly help in the pursuit of our questions.

Historical photos of the today very changed eastern part of the town can usually be searched in vain. Not even during the salvage excavations in 1950, led by Emanuela Bendor and Penuel Kahane of the Israel Department of Antiquities, were the only just destroyed medieval structures documented. Even meaningful overview photos looking over the deserted town were not taken.

During the current project an intensive search for old pictorial material ensued in a large number of archives. The hope was that buildings in the eastern part of the town known from the aerial photos and the SWP plan might be seen in more detail on a photograph.

Unfortunately this wish was only partly fulfilled. The picture collection of the École biblique et archéologique française de Jérusalem (EBAF), with a comprehensive stock of the 19th and early 20th cent., among others by Félix Bonfils, came up with a photo of the still standing town gate before its excavation (Taf. 21A). Other photographs give an overview of the western town part along the steep cliff (Taf. 21B). Two further pictures of the town gate, which at least give a view of the immediate surrounding topography, were found in the files of the Mandate period in the Rockefeller Museum.

There are no relevant photos in the photo archive of the Palestine Exploration Fund in London, the photo archive of the Israel Antiquities Authority in Jerusalem, the book and picture archive of the Bibliothèque Nationale de France in Paris, the British Library, the G. Eric and Edith Matson Photograph Collection in Washington as well as the Gustaf-Dalman-Institute in Greifswald.

Apart from the already exhaustively discussed military aerial photos, there are a number of other photographs which were taken in connection to the events of the First World War. From the end of May until the middle of July 1918 fighting had occurred at Arsuf between the troops of the British and the Ottoman Empire. The most important operation was the conquest of two hills, the “Sisters”, not far from Arsuf. This was achieved after heavy fighting between June the 8th and the 10th by Scottish, Indian and Pakistani troops. The Turks lost an important observation point. British troops stayed in Arsuf at least until the end of September. They camped on the beach, among others, below the castle and had built permanent quarters in the castle.

All photographs of this period we have located come from the Imperial War Museum in London and can be accessed online. Unfortunately no archaeologically relevant structures can be identified. This is somewhat different with an a few minutes long footage, which had been shot just after the battle around Arsuf. Admittedly the today overbuilt eastern part of the deserted town is not shown, but the collapsed walls below the castle have been well documented, thanks to the soldiers congregated there.

75 The footage can be found at http://www.iwm.org.uk/collections/item/object/1060022584 (access: 10/11/2016) with the title “Allenby meets Weizmann: Tel-el-Jelil, and Arslaf” (wrong spelling).
In all the pictures and the footage one can see that the area around Arsur and the actual town area were at that time treeless. As a consequence of the heavy grazing since the Mameluk period the earth was covered only by sparse grass and scattered low shrubs. Where the cliffs flatten out the dune fields stretched far into the hinterland.

7. Mandate Period Archaeological Surveys

In the Rockefeller Museum in Jerusalem the files of the British Mandate period (1918–1947/48) can be examined, which have only been accessible again recently. The extensive material on Arsur/Arsuf includes letters, official inspection reports, drawings and photographs. Next the already mentioned notes on stone robbing as well as the aerial photo of 1923 above all unpublished references to a burial site are important for the reconstruction of the town structures.

In the winter of 1945 a few burials had been washed out by the prodigious amount of rain just north of the town, on the outside of the town wall. A number of inspection reports in the following years until 1948 speak consistently of west–east aligned graves without grave goods. These can therefore indeed have been Crusader period burials, particularly as the Christian graveyard of the time has not been localized yet. Admittedly the burial of Jacques of Avesnes in the church of Mary has been referred to above, but such a burial place was only for people of high status, as rule nobility or members of the clergy. In contrast to the European homeland, a proper burial in the Holy Land did not stringently necessitate the proximity to relics residing in the church. If the Christian graveyard had actually been located to the north outside of town, then the localization would be similar to the well-known graveyard of Atlııt.

The most detailed inspection of the graves north of Arsur comes from the time just before the munitions factory was built. It was carried out by District Inspector JACOB ORI on the 6th of September 1948. He noted a long line of burials along the steep cliff. Despite the bad preservation of the bones, which had fragmented into small pieces, he could see that the heads were placed in the west looking to the east. The individual burials were in shallow graves and covered with little earth, only one or two graves had possibly been surrounded with stones. ORI postulated the hasty burial of soldiers who had died during one of the battles around the town. Since the bodies have not been placed on the side, with the face towards Mekka, they are presumably not Muslim burials, although this is not a hard rule.

Unfortunately the graves were completely destroyed by the construction of the factory. Today we find a huge modern drainage there. Own prospection of the area and below the steep cliff brought no more indications to burials. The salvage excavations that took place before the ditch was dug did not heed the coastal near burial ground and only focused on a single Roman, Byzantine and early Islamic industrial site further to the east.

The Early Islamic graveyard was most probably located near the later Sidna ‘Ali mosque to the south of the town, where graves are still visible today. The mosque had developed around the grave of the holy man after the conquest by Baibars. ’Ali ibn ’Alîm was buried in this place on the 20th August 1081, where probably the town graveyard had been. The

76 JOHNS 1947.
77 See PERKINS 1951, 86–87.
78 TARAGAN 2004, 85.
graveyard was respected by the Crusaders, shown in the fact that Baibars prayed there before the conquest of Arsūr. Baibars’ biographer, Ibn ‘Abd al-Zāhir, reports that the Franks recognized the miracles taking place at the graveside of ‘Ali. However, it is unlikely that the Christian settlers buried their dead there.

8. Results

Before the start of excavations it was attempted to collect as much information as possible on the medieval town by methods that would cause no destruction to the archaeological substance. These methods, next to the care for the archaeological monument, very often had the advantage of delivering data on large areas, possibly the entire deserted town and even its nearer environs. Elaborate and costly excavations could be conducted to clear up open questions in a second step. On the other hand, excavations allow a much more detailed insight into smaller areas than any other technique. Especially through the stratigraphic method changes in the structure of the town can be gathered across the periods of its existence. In the case of Arsūr non-invasive methods predominantly show the ultimate Crusader phase before the devastation beginning with the year 1265.

For the project those methods were chosen, which would best contribute to the answers to the research questions, namely remote sensing, geophysics, historical landscape analysis and the evaluation of older archaeological surveys. Their most important results are presented here in summary.

At the end of the Crusader period the town was surrounded by a strong wall with a wide moat in front of it, which also enclosed the castle in the north. Whereas this fortification is only partly preserved today, surface remains of it were still visible all around before the construction of the military factory in 1950. The moat however was almost completely filled and the walls mostly carried off and reused as building material before. Nevertheless, the town wall still projected in many places above the ground level. This has been documented particularly well in the area of the eastern gate. By the comparison of the modern laser scan with historical aerial photographs and the SWP plan, it could be proved that the lower parts of this fortification are still almost entirely conserved below the surface. Even in the east, despite the massive intrusion by the construction of the factory. Via GPR the walls were exactly located, and even the depth of the cover with piled up earth and debris can be estimated now. In the near future the archaeological park could be significantly enhanced by including the eastern part of the today two-parted town area and unearthing the town wall here.

At least some statements about the chronological development of Arsūr are possible. The Early Islamic town, already fortified before the Christian conquest, was of the same size or even bigger than the first Crusaders period town (Fig. 5). Only targeted excavations can answer the question whether the area around the castle was fortified to the end of the Crusader period or it had already been enclosed in the town wall before. A number of indications like level differences and the interpretation of written sources leastwise suggest a later town

\footnote{\textsc{Taragan} 2004, 84, 88.}
\footnote{\textsc{Taragan} 2004, 88.}
expansion. Evidently a fortification stood in Fatimid time where the later Crusader period
castle stands now, as the mention as ribat, the excavation of a round tower\textsuperscript{81}, and the

\textsuperscript{81} TAL/Roll 2011, 12.
discovery of a Fatimid coin hoard from the time right before the Crusader conquest\footnote{Although the youngest of 108 coins was minted in 1095/6 (Tal/Kool/Baidoun 2013, 268), which is only five years before the Christian conquest, the authors date the hoard’s burial to the time of the Mamluk capture (Tal/Kool/Baidoun 2013, 267).} show. The maritime installation below the castle proofed to be a breakwater and a protection of the cliff against the sea, rather than a port\footnote{Mirkin 2014.}. Though it surely was in use during the Crusader period, its original age remains unknown.

Within the fortification Crusader Arsour was not equally densely built in the last settlement phase. The geomagnetic survey revealed areas with compartmentalized stone buildings and such with wide spaces. South of the castle there was an open area, probably used by artisans. Of the medieval buildings none, apart from the castle, have survived above ground in a noteworthy way. However, the historical aerial photos show a few building locations in the centre of town, behind the eastern town gate and the north—eastern town wall. At least one church and one Christian burial site, which probably lay to the north of the castle, belonged to the Crusader period town. At a certain distance to the south of the town the Muslim burial site persisted even during the Christian dominion.

In the course of the project it became clear that the Crusader reign in Arsour was characterized by interruptions and was in no way linear. After the conquest of 1101 and the expulsion of the Muslim inhabitants it surely took some time, before the town regained its former population density. From 1187 to 1191 the area was under the sovereignty of Saladin. But even after the Christian reconquest the town remained desolate for a number of years. Once again the difficult if not impossible absolute chronological determination of all detected features proves to be the biggest disadvantage of every non-invasive method. The interpretation depends on the verification and calibration through professional experience and archaeological excavations.

In the end it has been shown that by a combination of different research methods a much more complete picture of the medieval town could be reconstructed than could have been achieved through archaeological excavations alone. On the other hand, the success of certain methods depends on the specific conditions of the studied site. Many sites in the Levant hold a similar post-depositional environment to that of Arsour, so the experiences are transferable to other places.

Acknowledgments

The German-Israeli project cooperation is jointly led by Prof. em. Dr. Dr. h.c. **Barbara Scholkmann** (University of Tübingen) and Prof. **Oren Tal**, Ph.D. (Tel Aviv University). I would like to thank them both for their collegiality and fruitful discussions about the topics presented here. Moreover Prof. Tal provided me with valuable information about his work and the older excavations in Apollonia/Arsour. As far as the results of the older excavations concern the medieval period, they are entrusted with **Elisabeth Yehuda**, Ph.D. (Tel Aviv University) in collaboration with Prof. Tal. The German-Israeli field work is headed by **Annette Zischka-Kenzler** M.A. (University of Tübingen). Surveys and excavations would not have been possible without the help of **Hagi Yohanan** B.A., director of the Archaeological Park Apollonia/Arsuf. He provided workers, material, infrastructure and other invaluable assistance. Dr. **Arno Patzelt** and Dipl. Geol. Dr. **Martin Waldhör** of Terrana Geophysik carried out the geomagnetic and georadar on-site surveys. Dr. **Daniel Burger** (Nuremberg) emphasized the relationship between town and castle. Many archives supported this work with the search for pictures, plans and other documents. Representative for them all I wish to thank Père **Jean-Michel de Tarragon** o.p. of

ZDPV 132 (2016) 2
the EBAF (Jerusalem), Felicity Carring of the PEF (London), and Silvia Kraiwick and Arieh Roachman-Halperin of the IAA Archive Branch (Jerusalem) for their kind assistance. Margret Sloan M.A. (Bamberg) and Sybil Harding M.A. (Tübingen) proofread the manuscript. Last but not least I have to thank all students, volunteers and other workers, who participated in the project.

Bibliography

Albertz, J.

Amitai, R.

Aspinall, A./C. Gaffney/A. Schmidt
2008 Magnetometry for Archaeologists (Lanham).

Ayalon, E./O. Tal/E. Yehuda

Behā ed-Dīn

Benvenisti, M.
1970 The Crusaders in the Holy Land (Jerusalem).

Bewley, R./D. Kennedy

Beyer, G.

Browell, E.V./W. B. Grant/S. Ismail

Casana, J./J. Cothern

Conder, C.R./H.H. Kitchener

Fowler, M.J.F.

Fulch
Fulcheri Carnotensis Historia Hierosolimitana (1095–1127); mit Erläuterungen und einem Anhang herausgegeben von H. Hagenmüller (Heidelberg 1913).
Medieval Town Structures of Arsūr on the Basis of Non-Invasive Methods

JOHNS, C. N.
1947 Guide to Atlit. The Crusader Castle, Town and Surroundings (Jerusalem).

JOL, H. M. (ed.)

KENZLER, H./B. SCHOLKMANNA/A. ZEISCHKA-KENZLER

KENZLER, H./A. ZEISCHKA-KENZLER
2015 German-Italian Research on the Crusader Town of Arsūr and Its Former Lordship, in: The European Archaeologist 43, 72–79.

KHALILIEH, H. S.

KONECNY, G./G. LEHMANN

KOPPITZ, U. (ed.)

Kvavme, K. L.

LAURENT, J. C. M. (ed.)
1864 Peregrinatores medii aevi quatuor. Burchardus de Monte Sion, Ricoldus de Monte Crucis, Odoricus de Foro Julii, Wilbrandus de Oldenborg (Leipzig).

LECKEBUSCH, J.
2001 Die Anwendung des Bodenraders (GPR) in der archäologischen Prospektion. 3D-Visualisierung und Interpretation (Internationale Archäologie. Naturwissenschaft und Technologie 3; Rahden/Westf.).

LYONS, U./M. C. LYONS

MIRKIN, D.

PERKINS, A.

PRINGLE, D.
2012 Pilgrimage to Jerusalem and the Holy Land 1187–1291 (Crusader Texts in Translation 23; Burlington et al.).

RAYNAUD, G. (ed.)

RICHARDS, D. S.
2001 The Rare and Excellent History of Saladin or Al-nawwādīr as-sultānīyya wa’t-mahāsīn al-Yūsufiyya. By Bahā’ al-Din Ibn Shaddād (Crusade Texts in Translation 7; Aldershot et al.).

RÖHRICHT, R.

1898 Geschichte des Königreichs Jerusalem 1100–1291 (Innsbruck).

ROLL, I.

ZDPV 132 (2016) 2

RRH Regesta Regni Hierosolymitani, ed. R. Rohricht (Innsbruck 1893).


British aerial photograph taken on December the 10th 1944; focal length of lens is 12°, ground elevation is 15,000 feet (4572m); topographic features seen with the stereoscope are marked (National Collection of Aerial Photography, Edinburgh; NCAP_JARIC_680PS_RA 0003 6036).

Medieval Town Structures of Arsūr on the Basis of Non-Invasive Methods (Seiten 151–174)
British aerial photograph taken on January the 1st 1923 showing the castle hill and 3/4 of the deserted town; focal length of lens is 9 1/2", ground elevation is 3000 feet (915m); Rockefeller Museum, Jerusalem.

Medieval Town Structures of Arsuv on the Basis of Non-Invasive Methods (Seiten 151–174)
Digital surface model of the present situation showing the deserted town from the south; model by author (measurement by SEE Advanced Mapping Systems and Solutions Ltd).

Medieval Town Structures of Arsur on the Basis of Non-Invasive Methods (Seiten 151–174)
Digital terrain model with the location of the geomagnetic survey (translucent; site 1 and 2 labeled), GPR survey (black; site a and b labeled); excavated and reconstructed walls of castle and town fortification in white (map by author).

Medieval Town Structures of Arsur on the Basis of Non-Invasive Methods (Seiten 151–174)
A. Geomagnetic survey in the area of the archaeological park (Universities of Tübingen and Tel Aviv).

B. GPR survey in the area of the former military factory (Universities of Tübingen and Tel Aviv).

Medieval Town Structures of Arsura on the Basis of Non-Invasive Methods (Seiten 151–174)
A. Eastern town gate in 1940, seen from the outside (EBAF Jerusalem, 06262-8292).

B. View from the south along the cliff in direction of the castle hill (EBAF Jerusalem; 06261-8291).

Medieval Town Structures of Arsuf on the Basis of Non-Invasive Methods (Seiten 151–174)
Der Deutsche Verein zur Erforschung Palästinas


Der Mitgliederjahresbeitrag, in dem der Bezugspreis dieser Zeitschrift inbegriffen ist, beläuft sich für korporative wie für individuelle Mitglieder derzeit auf € 40,--, für Studierende gegen Vorlage einer Immatrikulationsbescheinigung auf € 20,--. und soll nur bei der Postbank, Niederlassung Frankfurt am Main, Bankleitzahl 500 100 60, über das Konto Nr. 3548-604 „Deutscher Verein zur Erforschung Palästinas“ (IBAN: DE61 5001 0060 0003 5486 04; SWIFT-BIC: PBNKDEFF) entrichtet werden. Der Bezugspreis der Zeitschrift im Buchhandel beträgt zur Zeit € 50,--.

Manuskripte und Rezensionsexemplare sind zu senden an Prof. Dr. J. KAMLAH (Anschrift siehe den hinteren Umschlag dieses Heftes), Tauschexemplare an die Bibliothek des DPV, c/o Prof. Dr. U. HÜBNER, Theologische Fakultät, Leibnizstraße 4, D-24118 Kiel.

Die Adresse der Homepage des DPV lautet: http://www.palaestina-verein.de