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The Voyage of Synesius

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Synesius' letter to his brother, describing his passage from Alexandria to Cyrene, is a fruitful source of information on seafaring at the turn of the 4th century CE. The present article is an experiment to discover maritime information, based on this source and geographic and climatic facts. The distance from Alexandria to Azarium, the final landfall, is 360 nautical miles, although the distance actually sailed was 400 miles. The sailing, generally against the prevailing wind, lasted seven days, of which two were spent on shore. A log and a chart of the complete passage are suggested. Concentrating on the maritime details reveals the skill of the professional skipper, Amarantus, experienced in navigating these waters.

KEY WORDS

1. Synesius. 2. Amarantus. 3. Azarium.

1. INTRODUCTION. The following is an analysis of Synesius' passage, which is one of the most interesting and lively descriptions of sailing from ancient sources. This text (Epistola 4)[1] has been dealt with by several scholars.[2] However, additional maritime aspects, the sailing route, and navigational decisions can be extracted from this source. Casson analysed enough to prove his point regarding the skill of the captain, but did not go further.[3] In the letter two different aspects are described. The first, the discussions between the captain and the passengers, reveals little or nothing new on ships and sailing.[4] The second, the description of the passage, provides evidence on handling and navigating of a poorly maintained vessel by a highly skilled master, and also hints at the way of life of the seamen of the period.

2. THE VESSEL. Based on the description of the passage, and the number of the crew, it is clear that the vessel was a sailing ship, possibly with one or two pairs of oars for manoeuvering in harbour.[5] It is not stated whether the ship was equipped with a lateen or a square sail. Casson, basing his analysis on linguistic arguments, suggests she was a lateener.[6] Meijer, from similar arguments, writes of 'a common square-rigged ship'.[7] Meijer's opinion seems more logical, and the following points may be added to his argument:

- Refining Meijer's comment slightly: 'There are no representations of lateeners with more than one sail',[8] two-masted lateeners were apparently introduced later.[9]

Table 1. Average wind probabilities for an open sea passage (%).

	N	NE	E	SE	S	SW	W	NW	calm	Wind from NW, N, NE	Wind from SW, S, SE
April	14	11	11	9	5	4	15	25	6	50	18
July	15	1	1	1	1	2	20	55	4	71	4
October	26	14	6	5	3	2	7	27	10	67	10
January	15	11	8	6	9	13	16	17	5	43	28

- After doubling the temple of Poseidon they sailed 'with all sails (plural) spread'.[10]
- The square sails of the large merchant ships[11] did not attract Synesius' attention as being different. Of course, this could have been a result of his limited knowledge and experience.
- The ship continued to sail for a day and night with a broken yard, and arrived at her destination. This could not have happened if she had merely drifted or progressed only under a mainsail with a broken yard – she must have had at least one additional (auxiliary) sail. This additional sail was unlikely to have been a lateen sail, for the reason given above.

Comparing with other evaluations,[12] and as will be discussed below, the vessel could travel about 80 degrees to the true wind over the ground, slightly better than the 90 degrees proposed by Pryor.[13]

3. THE DATE OF THE PASSAGE. Fitzgerald suggested that the ship sailed on 28th January, 404 CE, although the years 396, 397, 402, 404, 410 and 413 have also been mentioned by him as proposed by others.[14] Meijer proposed January 402.[15] Garzya leaves open alternatives between January and May 402.[16] Rubin mentions these various datings of the passage, and also includes May 28, 401 and September 410.[17]

Two sources of data allow us to determine the season and date of the sailing: astronomical data and the weather.

3.1. *Astronomical data.* Modern software, using the data of the new moon on a Tuesday and the eighteenth of a month of the Egyptian calendar,[18] gives a date close to April 26, 404, which is Mesori 17–18 of the Egyptian calendar. It also shows that at the date of the passage, sunrise was about 5 am local time, and sunset about 6.30 pm.

3.2. *Weather conditions.* Sailing seasons, and the weather conditions which defined them, also add a little to the evidence of the date of the passage. The analysis is based on data given in the Mediterranean Pilot,[19] assuming that the weather has not changed significantly since antiquity.[20] Sailing seasons have been discussed by notable scholars.[21] The winter months, November to March, are out of the sailing season. Gales, according to the Mediterranean Pilot, are most frequent between December and February.[22] Thus the passage most probably took place between March and October.

Summaries from the Mediterranean Pilot data are given in the tables. The probabilities of open sea wind directions are given by two different wind roses that cover the relevant area.[23] Their average is shown in Table 1. Because of the low probability

Table 2. Summaries of daily winds from southern and northern directions (%), and rain, at 0800 and 1200 at the Alexandria land station.

Wind from	NW, N, NE	SW, S, SE	NW, N, NE	SW, S, SE	Rain	
Month	0800 Hrs		1200 Hrs		Days	mm
January	25	58	46	28	7	49
February	34	46	52	20	5	31
March	49	31	64	11	3	12
April	51	27	76	6	1	3
May	57	19	83	3	1	2
June	70	10	84	2	rare	rare
July	69	5	84	0	0	0
August	75	9	88	1	rare	rare
September	69	16	86	4	rare	rare
October	49	31	81	4	1	9
November	41	39	68	13	4	29
December	32	48	48	26	8	56

Table 3. Averages of Alexandria and Darnah land station climatic tables for selected months (%).

	Wind from Month	N	NE	E	SE	S	SW	W	NW	Calm	NW, N, NE	SW, S, SE
El Iskandarîya	April	24·0	13·5	6·5	6·5	5·5	4·5	12·5	26·0	1·0	64	17
	July	12·5	2·5	1·0	0·5	0·5	1·5	18·5	61·5	1·5	77	3
	October	26·5	14·0	4·0	4·5	8·5	4·5	9·5	24·5	4·0	65	18
	January	27·0	13·5	7·0	5·5	3·5	2·0	11·0	29·5	1·0	70	11
Darnah	April	8·5	4·0	15·0	4·0	12·0	3·0	25·0	23·0	5·5	36	19
	July	6·0	1·0	1·0	0·5	0·0	0·5	38·0	50·5	2·5	58	1
	October	13·0	7·5	4·0	4·5	19·0	7·5	8·5	28·5	7·5	49	31
	January	8·0	6·5	15·5	8·0	8·0	2·5	20·5	24·0	7·0	39	19

of winds from southern directions, the omission of July and August as the passage months is also suggested.

The daily land breeze is given in the Alexandria (El Iskandarîya) climatic table.[24] The summaries of wind probability from southern directions (SW, S, SE) and northern directions (NW, N, NE) are presented in Table 2.

The average wind is given as percentage probabilities for selected months at Alexandria (El Iskandarîya) and Darnah land stations in Table 3.[25]

On the first day it is mentioned that there was a south wind for a short while. This was perhaps a local phenomenon, not a morning land breeze, since it is reported during the afternoon. On the fifth and sixth days a continuous south wind is reported out to sea, which must have been the result of a weather system, and not a daily land breeze. This was not typical of the high summer months.[26]

Rain is reported towards the end of the passage. The rain data given for Alexandria more or less represents the relevant north Egyptian and Libyan coasts. The period from June to September, when actually no rain falls in this area, may be excluded. It sometimes rains in spring and autumn,[27] so the passage could have been made in either of these seasons.[28]

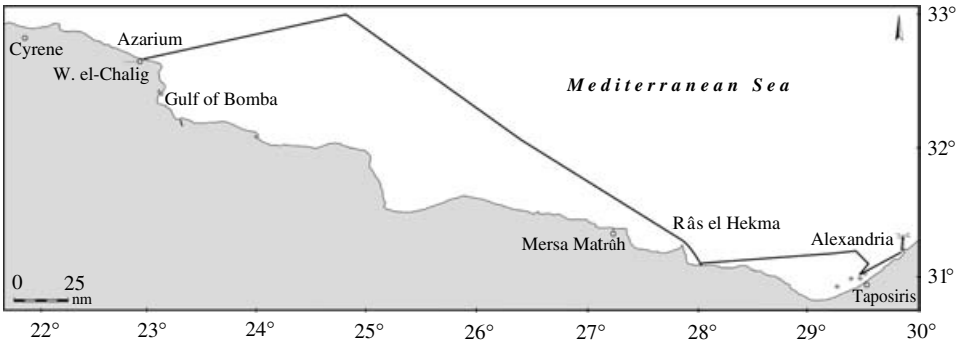

Figure 1. A suggested solution for Synesius' passage (Drawing S. Haad).

No matter what the season, the prevailing wind in this region is northwest, while with only very few exceptions, north and west winds are the next frequent, whether close to land or in the open sea. Wind direction described by Synesius should not be interpreted literally; as a seaman may sometimes describe the character of the wind rather than its exact direction. For example, if the prevailing northwest wind blows moderately with short, small but strong waves with 'white horses', a seaman may call a north wind producing the same effect a 'northwest' wind.[29]

4. ANALYSIS OF THE PASSAGE. (see Figure 1). The ship set out at 'early dawn', or first light. The reason for this timing seems clear: the morning land breeze from the south. As shown in Table 2, in the morning (0800) there is a chance of a favourable wind for leaving the harbour. This is probable only in the spring and autumn. However, the advantage of an early morning start made it difficult to judge depth in the poor light or because of the reflections of the low sun, which resulted in touching ground right at the beginning. This was not an exceptional event, since Synesius himself does not know whether it happened two or three times. The harbour of Alexandria was, and still is, shallow, with many reefs. Rocks, submerged and just breaking the surface, extend two nautical miles from the shoreline. Pharos Island is slightly protected by a line of rocks and obstacles stretching northeast-southwest. These hindered the ship, and the chance of clearing the harbour before the prevailing northwest wind got up was missed. Thus, the ship had to struggle out of the harbour and double the Pharos point against the wind. It is not mentioned how the ship got out of the shallows and sailed northward; presumably it was aided by a harbour tug,[30] or other means. Meshullam of Volterra describes how his ship grounded and was refloated at Alexandria, about one mile from the shore.[31] Interestingly, the earliest account of taking soundings comes from the same coast.[32] By noon, half a day after starting, they arrived at the Pharius Myrmex (Pharos), a mile from the shore.

As the ship left the harbour she changed course to southwest on the starboard tack. The Temple of Poseidon was located on the western edge of the Island of Pharos.[33] At this point the skipper faced a dilemma. Apparently, there was the prevailing northwest wind, which is confirmed by the ship's manoeuvers. The destination was slightly north of west, actually 285°. But the shore, for about 45 nautical miles, tended

in a general southwest direction towards Taposiris (about 240°). Instead of beating generally northwards, and actually northeast, further away from his destination, Amarantus chanced a more direct course, parallel to the shore. He could hope for a good passage and perhaps a change in the wind direction towards his destination, and evidently all sails were spread. Apparently the ship could raise at least two sails, mainsail and artemon.

As it happened, things became slightly more complicated, and they approached rocks that were observed even by landsmen. The chart of the area clearly shows rocks showing above water a few miles from the shore. There was no choice but to turn and sail on the port tack on a northeasterly course. As suggested above, they could make 80° degrees to the wind, thus the alternate course was not much better than about 040°.

They could, however, gain very little mileage to windward over the ground. At some point the wind changed and blew from the south, perhaps the change that Amarantus expected from his local knowledge. The south wind gave the ship more freedom on its north-west course, while gaining some distance from the coast, in the expectation of another change in the wind. When a 'stormy' north wind started the ship turned to a generally westward course on the starboard tack. Being far enough from the shore enabled her to progress westward, with some leeway towards the south, but safely clear of shallow waters.

The description of the wind change is convincing, and typical of this phenomenon in the Mediterranean. The sails that were trimmed to a south wind on the port tack on a general northwestern course became concave instead of convex. This perhaps could have been part of the tacking manoeuvre. This wind change from the south to northwest can be recognized on the surface of the sea and can happen within a few minutes. Once the wind changed to northwest Amarantus sheeted in the sails on the starboard tack, which is a natural reaction and good seamanship. All these manoeuvres were explained to Synesius.

Figure 1 and Table 4 set out Synesius' route as proposed. It is a sort of optimization, slightly more complicated than by 'compass and divider', as suggested by Casson,[34] but with almost no degrees of freedom. The constraints are the positions of Alexandria, the rocks near Taposiris, the stop-over on the coast, and Azarium, the destination. Although the stop-over is not precisely defined, the shoreline itself is a reference, and its position can be explained. Similarly, the wind direction, the tacking angle, the course and the speed, do not give much room for alternatives.

The hypothetical route is a result of calculations considering the above constraints. For example, increasing the close-hauled tacking angle (e.g. from 80° to 90°) means a longer passage, which demands a higher speed or more time, but the assumed speed of 6 knots is perhaps already too high. The time of passage is also constrained by the 'noontime' departure from Alexandria, and 'daylight' while sailing with the north wind, after the south wind, on the afternoon of the first day. Thus, since setting out from Alexandria harbour about midday, they sailed not more than seven hours until darkness fell.

At least four hours' sailing are required for the approximately 25 miles from Alexandria to Taposiris. Given approximately one hour's sailing after turning near Taposiris, and one and a half hours for the south wind, this brings the time to about 6.30 pm. Considering sailing with the north wind in daylight, and the events described after the coming of the Jewish Sabbath at sunset, this seems reasonable.

Table 4. A possible route.

Start		End		Estimated course (degrees)	Speed (knots)	Duration (hours)	Distance (Nautical miles)	Notes
Day	Estimated time	Day	Estimated time					
1	12.00	1	16.00	240	6	4	24	Start after Temple of Poseidon
1	16.00	1	17.00	040	6	1	6	Off Taposiris
1	17.00	1	18.30	315	6	1.5	9	South wind
1	18.30	1	20.30	265	6	2	12	
1	20.30	1	24.00	–	–	3.5	–	Calm
2	00.00	2	09.00	265	6	9	54	First landing
2	09.00	4	06.00	–	–	45		On shore
4	06.00	5	18.00	305	5.5	36	198	
5	18.00	5	22.00	–	–	4		Calm
5	22.00	7	02.00	260	3.5	28	98	Yard broke
7	02.00	7	06.00			4		Waiting for daylight
7	Morning						5	5 miles, harbour pilotage
Direct distance Alexandria–Azarium							360	
Total estimated sailing distance							400	Rounded figures
Overall estimated passage time (hours, including shore stop)							137	
Overall estimated passage time (days, including shore stop)							6	
Estimated sea time (hours)							92	
Estimated sea time (days)							4	
Average estimated passage speed at sea (knots)							4	

During the following hours Amarantus, who was Jewish, as were some of his crew, observed the Sabbath by allowing the ship to drift; but only because the wind had dropped and allowed him to do so safely. Without wind, but with a swell remaining at the end of the first day's sailing, they could do nothing, except wait and pray, devoting this break to their personal religious rituals.

Towards the middle of the night the wind rose again. Amarantus resumed control, conforming to the Jewish precept that saving life takes precedence over observing the Sabbath, and sailed continuously until the fourth hour of the day, when they arrived at the shore, after about 30 hours at sea. From the description of the difficulties, and the next two days ashore waiting for the wind and the sea to quieten, a northwest prevailing wind is postulated. If the wind had been from a southerly direction they would have had no reason to stop; and as they were close to the shore, their view of the sea would not have been reported as tempestuous. The ship was safely riding in the open sea – not in a harbour – to her sole anchor, which could not have held against a violent sea or wind, which implies nothing more serious than a typical seasonal gentle-to-moderate northwestern wind.

The purpose of their landing is not clear; perhaps after Friday night's events Amarantus gave the passengers the alternative of travelling overland to their destination, which they did not do. Perhaps, realizing their discomfort while sailing, he preferred to let them rest in a well-known place, expecting a continuous unfavorable wind and sea. The passage track and the chart give a clue to another possibility. Amarantus sailed with a northwest wind close-hauled on the starboard tack. As he

approached the coast he could see Râs el Hekma, (also known as Râs el Kanâyis) on his starboard bow. Doubling this cape needed difficult tacking in unfavorable conditions for more than ten miles. On the other hand, the cape gives some shelter from the northwest wind, and several small anchorages (mersa) exist to its east.[35] Local knowledge is needed to manoeuvre between the reefs and to anchor safely. Therefore, Amarantus anchored in daylight, preferring a stop-over to fighting the sea. Whether he might have done the same had he sailed without passengers, or continued to tack against the wind and sea, remains speculative.

By the way, the norm of carrying three anchors is reported, similarly to the four anchors cast by St. Paul's vessel,[36] and more than one of the later ships of Ibn Jubayr.[37] The ship in which Felix Fabri returned from the Holy Land also had more than one anchor.[38] The existence of a small service boat with which they landed is explained by the passengers' actual landing while the ship anchored in the open sea. A similar boat is mentioned in St. Paul's journey[39], and in the later descriptions of the passages of Ibn Jubayr[40] and Meshullam of Volterra.[41] The galley of Felix Fabri carried more than one boat at the stern.[42] Two boats are beautifully represented in the Torlonia relief.[43]

The difficulties of handling wet sail and rigging during the night are well expressed; whether replacing the sail (according to Casson), or reducing its area by brailing it (according to Meijer). The authenticity of the maritime illustrations is corroborated by the description of highly-tensioned ropes and jammed blocks.[44]

Almost 48 hours were passed on shore, then early in the morning of the fourth day, a favourable southerly wind arose, carrying the ship on for about 36 hours. Being experienced seamen, and expecting a change of wind to northwest–north, they probably sailed to the north of their destination. The general line of the coast from their landing point to Azarium is 290°, and the suggested course is 305°. While making the maximum under the circumstances towards the destination, a considerable distance from the shore was gained. Their suggested speed is 5.5 knots (6 knots seems slightly too fast; and if slower, the ship would not have reached Azarium within the reported time). When the wind changed to north-by-west, which was the prevailing wind, together with heavy rainfall, they made for Azarium. Once again, the ship sailed on a generally westward course, with the experienced Amarantus gaining enough distance to the north, but not too much, in order to sail directly to his destination. It seems that Synesius, although uncomfortable, admits the advantage of this wind. The analysis suggests they reached about 60 nautical miles from the coast, out of sight of land. This was not a long tack: it was optimizing the route to the destination, using the south wind to gain some distance to the north, with the expectation of the wind changing to northwest. Amarantus had made some spare miles of sea-room, just in case – excellent seamanship.

Once the northwest wind started they faced problems with the sail. Synesius dramatically describes how the yard broke and almost killed them all, although nobody was actually harmed. Similar events are described in the first journey of Ibn Jubayr, when the yard fell twice, and that of Meshullam of Volterra, when the yard fell; with nobody being harmed in either case. Likewise nothing happened to the crew or passengers of the galley in which Felix Fabri sailed, after the torn mainsail was replaced.[45]

The ship sailed slowly for a day and a night, and in the morning of the seventh day arrived exactly at her destination. The ship was under control, although not at her

maximum speed under full sail. Because the mainsail could not be efficiently used, apparently only the small second sail was used. Amarantus was ready, his speed was reduced, and he had gained a few spare miles to the north. It is estimated that at least an additional 5° has to be added to the leeway, and the speed is assumed at slightly less than 3.5 knots. As stated above, not many alternatives exist in calculating the route. Thus it seems impossible that the ship drifted with the northwest wind towards Azarium under bare poles. On the other hand the ship did not 'run' in the usual meaning of the word – sailing with the wind well abaft – rather she was carried along. The same applies to the description of sailing towards the stop-over shore, which is translated as 'running' under full sail.

The ship did not ground on the reefs off the entrance to Azarium. The text itself, if carefully read, describes a close approach, but not an actual grounding,[46] and the subsequent events are not those of a ship that touched rocks while sailing. The description of the actions of the crew is of a safe arrival in a strong wind with a malfunctioning rig at night at a dangerous harbour with reefs near the entrance, and then waiting to be piloted in daylight.

The question of navigation, however, remains open. How did Amarantus navigate by night in heavy weather precisely to port? No clue to navigational aids or methods is given. It was not merely coastal navigation, since they also sailed far out of sight of land.

The journey ended at Azarium; thus the exact course can be estimated with some confidence. In Table 4, which corresponds to Figure 1, one possible solution, which summarizes the above details, is suggested.

The pilot tied up his harbour service boat to the ship, came aboard, and directed the ship. He sailed the ship about five nautical miles to her mooring inside the harbour. The pilot then guided five more vessels into the harbour. Despite Synesius' terrifying tale, Amarantus had proved his skills by actually arriving in harbour a day earlier than ships that set out from Alexandria a day before him.

5. CONCLUSIONS. Synesius endured a normal passage under the prevailing conditions, with no unusual events. He probably sailed in the spring, or possibly the autumn, but unlikely in summer or winter. The problems with the gear and rigging would have been expected during a normal voyage. Synesius' dramatic descriptions are the result of his ignorance of the sea and sailing. His letter, including the exaggeratedly negative description of the behaviour of the captain and crew, should not be taken at face value, but rather be evaluated carefully and weighed against the actual results. The analysis of the ship's performance indicates that a square-rigged vessel of the period could sail close-hauled 80 degrees to the true wind over the ground.

The calculated passage time is only about four days. They arrived at Azarium, which is about 360 miles from Alexandria. This coincides with Garzya's location of Azarium, and is a slightly shorter distance than that calculated in Jones' analysis.[47]

The truth is that Amarantus performed impressively. He sailed relatively fast, with malfunctioning rigging, without spares, arriving at night exactly at the harbour entrance between reefs, waiting for the pilot, and safely mooring in the harbour. One can only wonder how Amarantus navigated.

ACKNOWLEDGEMENTS

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[3] Casson (1952), 294–296.

[4] Casson (1995), p. 268 note 1; Meijer (1986), 67; Hendry, M. (1994). Seneca, St. Paul, Synesius, and the Text of the Europa Ode. *Syllecta Classica* **5**, 63–69.

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[6] Casson (1995), pp. 268–289; Casson (1996), pp. 49–51.

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[8] Meijer (1986), 68.

[9] Martin, L. R. (2001). *The Art and Archaeology of Venetian Ships and Boats*. Texas A&M University Press, College Station, p. 145 fig. 133; Brindley, H. H. (1926). Early pictures of lateen sails. *Mariner's Mirror* **12:1**, 9–22; Pietro Janni, *Il mare degli Antichi: tecniche e strumenti di navigazione* (http://www.192.167.112.135/NewPages/COLLANE/TESTIQDS/arch_sub/A_Sub_14.pdf, 29th November, 2005), 10.

However, one should be more careful in deducing whether a sail was square or lateen, based on the method of furling. In a recent analysis of the ship depicted in the Kelenderis mosaic, dated to 500 CE, P. Pomey has drawn the attention of the existence of 'trapezoidal sail' – a version of the lateen sail with brails (Pomey, P. (2005). Un nouveau témoignage sur la voile latine: la mosaïque de Kelenderis (v. 500 ap. J-C; Turquie). Abstracts of the *9th International Symposium on Ship Construction in Antiquity, 25–30 August, Agia Napa, Cyprus*. The Hellenic Institute for the Preservation of Nautical Tradition and The Pierides Foundation, Cyprus and Greece).

[10] In plural, and see Meijer (1986).

[11] 'Doubled-sailed cargo vessels' by Fitzgerald (1926), p. 82, and 'double-masted freighters' by Meijer and Van Nijf (1992), p. 172, and see *holkades* in Casson (1995), p. 169.

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[24] Mediterranean Pilot, p. 45 Table 1.174.
[25] Mediterranean Pilot, p. 43 Table 1.172, p. 45 Table 1.174.
[26] As is clearly shown in the Mediterranean Pilot, p. 31 diagram 1.151.3.
[27] Mediterranean Pilot, p. 43 Table 1.172 – Darnah, p. 44 Table 1.173 – Salûm, p. 45 Table 1. 174 – Alexandria.
[28] It is unlikely that a squall is described. It is generally associated with a north or north-east wind – see Mediterranean Pilot, p. 18 – which is not reported in the text.
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[40] Broadhurst (1952), p. 337.
[41] Ya'ari (1948), pp. 82, 83.
[42] Felix Fabri, p. 42.
[43] Basch, L. (1987). *Le musée imaginaire de la marine antique*. Hellenic Institute for the Preservation of Nautical Tradition, Athens, p. 465 fig. 1038.
[44] See notes 6, 7 above; and see e.g. Torlonia relief.
[45] Broadhurst (1952), pp. 28, 327, (March 16th 1183 and October 27th 1184); Ya'ari (1948), p. 82; Felix Fabri, p. 38.
[46] I am grateful to Dr. Ivor Ludlum for his assistance in interpreting the Greek text.
[47] Jones, A. H. M. (1964). *The Later Roman Empire 284–602*. Basil Blackwell, Oxford, **2**, p. 843.