Mathieu Ossendrijver

Science in Action: Networks in Babylonian Astronomy

Like no other cultural achievement, astronomy stands out as a legacy of Babylon. The Chaldaean astronomer, a stock character of the biblical and classical literature, is the personification of that legacy.[1] In this contribution I investigate the astronomers of Babylonia as participants of a network of interacting scholars. With this approach I hope to expand our knowledge of the practice and context of Babylonian astronomy, which is still rather limited. Babylonian astronomers created a large and diverse body of literature consisting of observational astronomy, mathematical astronomy, zodiacal astrology, and omen astrology.[2] Especially the observational texts, by far the most numerous group, imply that astronomy was the collaborative effort of a community of scholars. Since most astronomical diaries contain observations for 6 months, they must have been compiled from individual reports of different scholars. The same holds for other compilations extracted from the diaries, some of which contain data for many decades. Also the fact that observational texts, unlike other scholarly texts, are anonymous (with very few exceptions; cf. below), can be viewed as a consequence of the collaborative effort by which they were produced. Astronomical diaries and related texts are therefore testimonies of a systematic, collaborative program of observation. This program is believed to have existed continuously from the Neo-Babylonian era, perhaps as early as the middle of the 8th c. BC, until the very end of cuneiform writing in the 1st c. AD.

Next to nothing is known about the astronomers of the Neo-Babylonian era, since we have only anonymous observational texts from that period.[3] The earliest reference to astronomers is contained in an Achaemenid-era administrative document of the Esagila temple concerning food rations for 14 astronomers.[4] This suggests that astronomers were by now – in surprisingly large numbers – employed by the temples. In spite of political upheavals, the observational program continued throughout the Achaemenid, Seleucid and Parthian eras (450 BC–50 AD), as evidenced by thousands of diaries and related texts,

1 Astronomer is to be understood in a broad sense as a specialist of the astral sciences, i.e. astronomer/astrologer.

2 The four groups are composed as follows: 1) Observational astronomy: astronomical diaries, planetary reports, eclipse reports, Lunar-Six reports, Goal-Year texts, almanacs, normal-star almanacs. 2) Mathematical astronomy: procedure texts, auxiliary tables, synodic tables, template tables and daily motion tables. 3) Zodiacal astrology: horoscopes, calendar texts, and various other texts 4) Omen astrology: the series 'When Anu and Enlil' and its commentaries.

3 We do not know, for instance, whether they were primarily associated with the court, like the astrologers of the Neo-Assyrian era, or with the temples, as is evident in the later periods.

4 P.-A. Beaulieu, The Astronomers of the Esagil Temple in the Fourth Century BC, in: A. K. Guinan (ed.), If a Man Builds a Joyful House, Leiden 2006, 5–22.

nearly all from Babylon. However, the Achaemenid era was also a time of fundamental innovations which led to mathematical astronomy and zodiacal astrology. It is therefore legitimate to ask whether these different forms of astronomy and astrology, which require rather different skills, were practiced by a single network of scholars. The answer to this question is provided by several texts from Babylon. A few astronomical diaries from the Seleucid era do mention the name of a scribe.[5] One of them is Bēl-apla-iddin/Mušallim-Bēl from the Mušēzib-clan, who is known to have written two tablets with mathematical astronomy.[6] Secondly, a Parthian-era protocol of the Esagila counsel lists mathematical astronomy (*tērsītu* = 'computed table') and observation, using the technical term for diaries (*naṣāru ša ginê* = 'regular watch'), among the duties of an astronomer.[7] Incidentally, this document also states that the astronomers were expected to perform their duties in collaboration.

The evidence from Babylon therefore suggests that the various astral disciplines were pursued by a single community of collaborating scholars. In order to study this community in more detail we may to turn our attention to the library of the Rēš temple in Uruk.[8] Unlike the scholarly tablets from Babylon, those from the Rēš usually document a collaboration between two individuals, in the sense that each colophon mentions an 'owner', identified by the phrase 'tablet of PN_1' (*ṭuppi* PN_1), and, in second position, a scribe, identified by the phrase 'hand of PN_2' (*qāt* PN_2). By collecting this information, and combining it with data from non-scholarly documents, we can reconstruct the biographies of the astronomers, and the network of their scholarly and economic interactions.

Elsewhere I have presented first results of this approach.[9] In particular, I have argued that the activities of scribe and 'owner' of scholarly tablets correspond to strictly consecu-

5 ADRT 1, –372A; –361; –321; ADRT V, 60.

6 He wrote the procedure texts ACT 816 (O. Neugebauer, Astronomical Cuneiform Texts: Babylonian Ephemerides of the Seleucid Period for the Motion of the Sun, the Moon, and the Planets, I–III, London 1955) and BM 33552 (J. P. Britton/C. B. F. Walker, A 4th century Babylonian model for Venus: B.M. 33552, Centaurus 34 [1991], 97–118), the diary ADRT I –321 (BAK 180), and perhaps, as proposed by Oelsner (Von Iqīšâ und einigen anderen spätgeborenen Babyloniern, in: S. Graziani (ed.), Studi sul Vicino Oriente Antico dedicati alla memoria di Luigi Cagni, Naples 2000 [= Istituto universitario orientale dipartimento di Studi Asiatici Series Minor 61], 797–814), also ADRT V 60, a compilation with Jupiter observations.

7 CT 49, 144: G. J. P. McEwan, Priest and Temple in Hellenistic Babylonia, Wiesbaden 1981 (= Freiburger Altorientalische Studien 4), 18–21; cf. also R. van der Spek, Bibliotheca Orientalis 42 (1985), 551–552; F. Rochberg, in: J. Marzahn/H. Neumann (eds.), Assyriologica et Semitica. Festschrift für Joachim Oelsner anläßlich seines 65. Geburtstages am 18. Februar 1997 (= Alter Orient und Altes Testament 252), Münster 2000, 359–375.

8 About 150 tablets, many of a scholarly nature, were found during the German excavations in room 79b near the SE gate. It is believed they are the remainder of the temple library (Uruk 4 in the list of O. Pedersén, Archives and Libraries in the Ancient Near East 1500–300 BC, Bethesda/ML 1998), and that many other scholarly tablets from Uruk, e.g. those published in TCL 6 (Textes cunéiformes. Musée du Louvre. Département des Antiquités Orientales), originate from this library.

9 M. Ossendrijver, Babylonian astronomers in context: a network approach, in: Proceedings of the 53rd RAI: Babel und Bibel (in press) and Id., Exzellente Netzwerke: die Astronomen von Uruk, in: G. Selz (ed.), The Empirical Sciences in Mesopotamia, Vienna, 2011, 631–644.

tive, non-overlapping phases in the biography of a scholar. Secondly, the scribe phase involves advanced, specialised education. Thirdly, the transition to the 'owner' phase may correspond to the assumption of a temple position. Fourthly, the scholarly tablets were not physically possessed by the 'owners', since most of them were kept in the library of the Rēš. It rather appears that 'ownership' of a scholarly tablet reflects a responsibility for the correctness of its content, i.e. an aspect of supervision. Fifthly, the scholarly library of the Rēš is a product of advanced scribal education, since nearly all of its tablets were written by students (the scribes) under the guidance of a supervisor (the 'owners'). In other words, very few tablets from the Rēš were written by scholars who are in their 'owner' phase. Sixthly, legal acts, which clearly belong to a different professional realm than the scholarly tablets, were written by scholars in both phases. Finally, by following the collaborations between 'owners' and scribes it is possible to reconstruct the network of the astronomers of the Rēš, the result of which is shown in Fig. 1.

In what follows I will exemplify these results by considering the biography of one scholar, the exorcist Nidinti-Anu/Anu-bēlšunu of the Ekur-zākir-clan, who has not yet received much attention. I will then expand and refine the interpretation of the network of astronomers. Table 1 lists the tablets that can be attributed to Nidinti-Anu with a certain likelihood.[10] Nidinti-Anu is attested as scribe of two scholarly tablets, both of which are omen texts. Text 1, which is unedited, may contain birth omens. Text 2 is concerned with extispicy, which was to become his favorite subject (Texts 2, 4, 6–9, 11). The 'owner' of Text 2, probably also of Text 1, was Anu-balāssu-iqbi/Anu-aḫa-ittannu of the Aḫûtu-clan. Like other members of that clan, Anu-balāssu-iqbi occupied high positions in the city, namely 'chief mayor of Uruk' (*rabû rēš āli ša Uruk*)[11] and 'delegate of the temple' (*paqdu ša bīt ilāni*).[12] Hence Nidinti-Anu studied with an elite person from another clan. Whether he was also instructed by his own father, as is true for many of his colleagues, we do not know, since his father is not attested.

10 This table is based on lists compiled by Wallenfels (Seleucid Archival Texts in the Harvard Semitic Museum [= Cuneiform Monographs 12], Groningen 1998), p. 26, Boiy (Hellenistic Legal Documents from Uruk in the "Royal Museums of Art and History" [Brussels], Akkadica 124 [2003], 19–64), p. 27, and Clancier (Les bibliothèques en Babylonie dans la deuxième motié du 1er millénaire av. J.-C. [= Alter Orient und Altes Testament 363], Münster 2009), p. 62. Boiy (2003) also mentions RIAA2 299 = O 196 (duplicate: Bibliotheca Mesopotamica 24, 24), a deed of sale dated SE 101 and written by a Nidinti-Anu/Anu-bēlšunu//[NN], who might be the same individual.

11 In the colophon of Text 2.

12 As a party in the legal act Forschungen und Berichte 16, 1 (VAT 9175), a land lease dated SE 91.

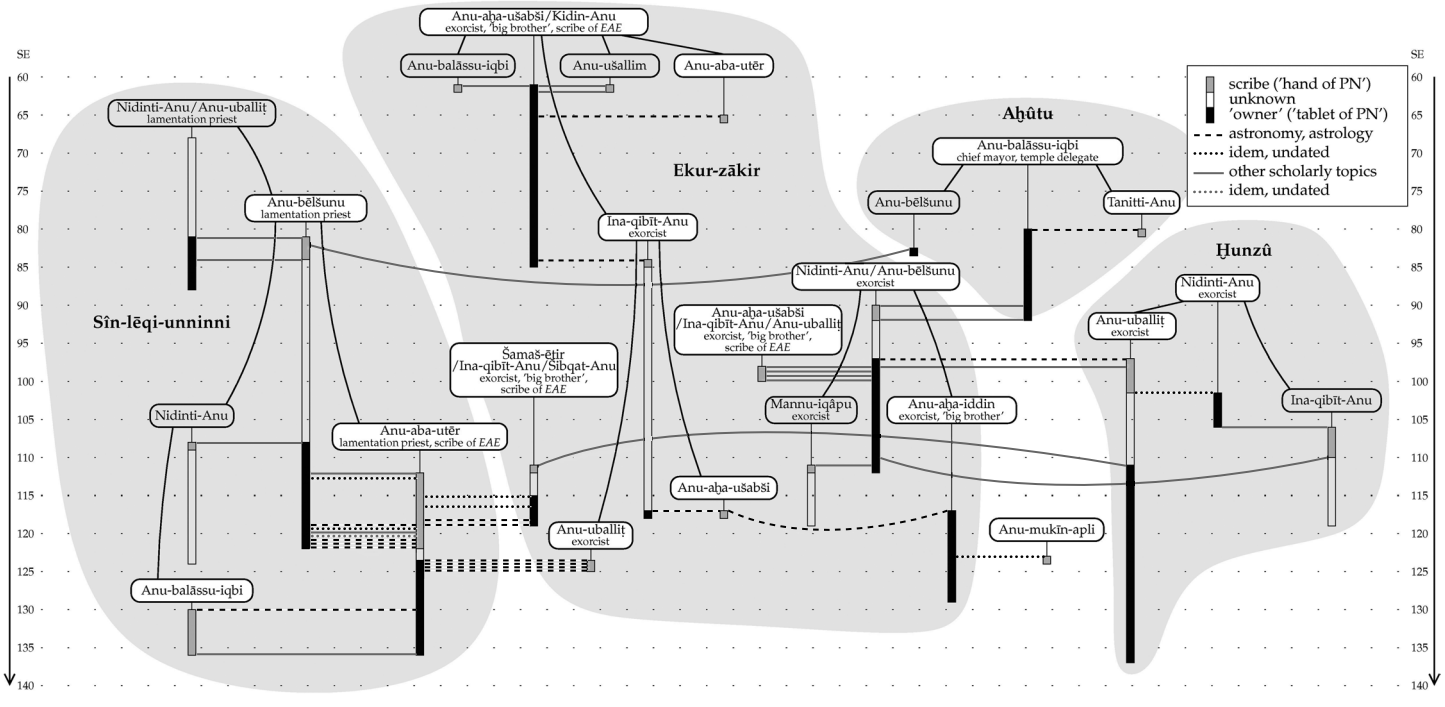

Fig. 1 | Network of the astronomers and associated other scholars of the Rēš temple in Uruk during the Seleucid period. Time increases downward from SE 60 to SE 140. Each scholar is represented by a vertical bar, the colour of which indicates his role as scribe (grey) or 'owner' (black) of tablets, or whether this could not be established (white). Vertical curved lines between two individuals indicate paternal links. Each horizontal line (for clarity sometimes an arc) represents an instance of collaboration between scribe and 'owner' as evidenced in the colophon of a scholarly tablet. The dotted ones are undated, i.e. their vertical position is uncertain.

Table 1 | Tablets mentioning Nidinti-Anu/Anu-bēlšunu//Ekur-zākir[13]

	tablet[14]	find spot	content	filiat.[15]	role	title	collaborator[16]	date (SE)[17]
1	*TU* 10	?	birth omens?	12a	scribe	exorcist of A&A	[Anu-balāssu-iqbi]	90
2	*TU* 1	?	*Multābiltu* T.14	12a	scribe	exorcist of A&A	Anu-balāssu-iqbi	4/II/91
3	*TU* 16	?	*EAE* T.56	12a	'owner'	exorcist of A&A	Anu-uballiṭ	30/VII/97
4	*BRM* 4 12	?	*Barûtu* T.55	12a	'owner'	exorcist of A&A	Anu-uballiṭ	25/II/98
5	*TU* 35	?	*Erimḫuš* T.5	12a	'owner'	exorcist of A&A	Anu-aḫa-ušab ši	5/II/99
6	*BRM* 4 13	?	*Barûtu* T.7	12a	'owner'	exorcist of A&A	Anu-aḫa-ušab ši	7/II/99
7	*TU* 4	?	*Barûtu* T.48	12a	'owner'	exorcist of A&A	Anu-aḫa-ušab ši	27/II/99
8	*TU* 2	?	*Šumma martu* T.2	12a	'owner'	exorcist of A&A	Anu-aḫa-ušab ši	1/X/99
9	*TU* 3	?	*Pān tākalti* T.6	12	'owner'	absent	Anu-aḫa-ušab ši	13/X/99
10	*TU* 7	?	sacrificial omens	[12a]	'owner'?	exorcist of A&A	Anu-aḫa-ušab ši	15/[m]/99
11	*TU* 5	?	*Rikis girri* T.20	12a	'owner'	exorcist of A&A	Ina-qibīt-Anu	absent
12	NCBT 2306	?	deed of sale	?	scribe	–	–	14/V/104
13	MLC 2188	?	deed of sale	?	scribe	–	–	14/IX/106
14	*RIAA2* 294	?	deed of sale	12a	scribe	–	–	10/X/107
15	MLC 2165	?	deed of sale	?	scribe	–	–	18/VII/108
16	*VS* 15 18	?	deed of sale	12a	scribe	–	–	8/[m]/108
17	NCBT 1971	?	deed of sale	?	scribe	–	–	3/IX/108
18	*CM* 12 4; *BRM* 2 30	?	deed of sale	12a	scribe	–	–	16/VIII/109
19	*BiMes* 24 51	?	hymn to Adad?	12a	'owner'	[exorcist] of A&A	Mannu-iqâpu (1)	[d/m]/111
20	*OECT* 9 47	?	deed of sale	12a	scribe	-	-	11/V/112
21	*SpTU* 2 33	Ue XVIII[18]	*Šumma ālu* excerpt	12a	'owner'	exorcist of A&A	Mannu-iqâpu (2?)	[d]/VII/[yr]
22	*BaM Beih* 2 65	SE gate[19]	medical omens	[1]2a	'owner'?	broken	[NN]/Nidinti-Anu	[d/m/yr]

During Nidinti-Anu's 'owner' phase at least 4, perhaps 5 individuals are attested as scribes of his tablets. Texts 3 and 4 were written by the exorcist Anu-uballiṭ/Nidinti-Anu/Ina-qibīt-Anu from the Ḫunzû clan.[20] Text 3 is Tablet 56 of the astrological omen series *Enūma Anu Enlil*, wich contains omens about planets. It is the only astrological text on Nidinti-Anu's list, and the reason why I include him in the network of astronomers. According to the colophon, this tablet was copied from an original from Babylon – a rare explicit hint at scholarly interactions between Babylon and Uruk. Text 4 is the 55th tablet of the extispicy series *Barûtu*, also labeled as the 6th tablet of its subseries *Ubānu* ('Finger'). Text 11 is also about extispicy. It was written by Ina-qibīt-Anu/Nidinti-Anu//Ḫunzû, a brother of the aforementioned. He is known to have written only one other scholarly tablet, the mathematical text *TU* 31, which was 'owned' by his father. Neither of these tablets preserves a date, but on 18 IX SE 118 Ina-qibīt-Anu appears as a witness in the legal act BRM 2, 31, which was written by Nidinti-Anu's son Mannu-iqâpu (cf. below).[21]

Texts 5–10 were written by the exorcist Anu-aḫa-ušabši/Ina-qibīt-Anu/Anu-uballiṭ// Ekur-zākir, all within a period of less than a year. His kinship relation with other scholars

13 The conventional notation for filiations involves a dash (/) for parental links and a double-dash (//) preceding the ancestral (clan) name.

14 The sigla in this column refer to published copies as far as available. Museum numbers, references to the colophons in BAK, and editions: **1** AO 6466: BAK 96B. **2** AO 6452: BAK 96A; Koch (Secrets of Extispicy, Münster 2005), 190–210. **3** AO 6470: BAK 90B; Largement (Contribution à l'Étude des Astres errants dans l'Astrologie chaldéenne (1), Zeitschrift für Assyriologie 52 [1957]), 235–264). **4** MLC 1865: BAK 95A. **5** O 171: BAK 90C; MSL 17, 65–72, Ms. A. **6** MLC 1874: BAK 95B. **7** AO 6468: BAK 90A; Jeyes (in: A. R. George/ I. Finkel (eds.), Wisdom, Gods and Literature. Studies in Assyriology in Honour of W.G. Lambert, Winona Lake 2000, 345–373), Ms. C. **8** AO 6453: BAK 104B. **9** AO 6457: BAK 104C; Koch (op.cit., 2005), 343–353, Ms. A. **10** AO 6468; BAK 103G. **11** O 172: BAK 104D; Koch (op. cit., 2005), 297–312. **12,13,15,17** to appear in Yale Oriental Studies 20 (2010); dates taken from Doty (Cuneiform Archives from Hellenistic Uruk, Yale 1977). **14** O 198: Corò (Prebende Templari in Età Seleucide, Padova 2005 [= History of the Ancient Near East. Monographs 8]), 166–168; Boiy (Hellenistic Legal Documents from Uruk in the "Royal Museums of Art and History"[Brussels], Akkadica 124 [2003], 19–64). **16** VAT 7758: Corò (op. cit., 2005), 194–195; Funck (Uruk zur Seleukidenzeit, Berlin 1984 [= Schriften zur Geschichte und Kultur des Alten Orients 16]), 200–202. **18** Cuneiform Monographs 12,4 = HSM 913.1.2 (7310); duplicate: BRM 2 30 = MLC 2130. **19** A 3673. **20** Ash 1923.727. **21** W 22729/7; edition in Spätbabylonische Texte aus Uruk 2. **22** W 20030/18.

15 The code indicates which generations are present in the filiation, such that 1 denotes the indivual, 2 the father, 3 the grandfather, and a the ancestral name.

16 In the case of a scholarly tablet, the collaborator is the other individual mentioned in the colophon.

17 The year SE 1 corresponds to 3 April 311 BC–21 April 310 BC of the Julian calendar.

18 Excavated in the living quarters of area Ue XVIII, in the same house as the library of the exorcist Iqīšâ// Ekur-zākir (UVB 29–30, pp. 95,102). Since Iqīšâ's tablets are about 100 years older, this tablet must belong to a younger layer, as suggested by Oelsner (Aus dem Leben Babylonischer "Priester" in der 2. Hälfte des 1. Jahrtausends v. Chr. [am Beispiel der Funde aus Uruk], in: J. Zablocka/S. Zawadzki [eds.], Šulmu 4. Everyday Life in the Ancient Near East, Papers presented at the International Conference, Poznań, 19–22 September 1989, Poznan 1993).

19 Found in a niche in room 79b (G. Lindström, Ausgrabungen in Uruk-Warka. Endberichte 20, p. 211).

20 For his biography cf. M. Ossendrijver, Exzellente Netzwerke: die Astronomen von Uruk, in: G. Selz (ed.), The Empirical Sciences in Mesopotamia, Vienna 2011, 638–640.

21 Ina-qibīt-Anu/Nidinti-Anu/Ina-qibīt-Anu//Ḫunzû (Rev. 24). This document is partly translated by Funck (Uruk zur Seleukidenzeit [Schriften zur Geschichte und Kultur des Alten Orients 16], Berlin 1984, p. 289.

of the Ekur-zākir clan remains unclear. He was not only a productive scribe, but a high-ranking person, judging from his title 'Big Brother of the Rēš' (*aḫu rabû ša Rēš*). This high priestly function is attested for three other scholars of the Rēš, all members of the Ekur-zākir clan, among which Nidinti-Anu's son Anu-aḫa-iddin (cf. below).[22] His third title, 'scribe of *Enūma Anu Enlil*' (*ṭupšar Enūma Anu Enlil*), implies that Anu-aḫa-ušabši was an astronomer, but thus far the tablets do not confirm this. Except Text 5, which is tablet 5 of the bilingual lexical series *Erimḫuš*, all tablets written by Anu-aḫa-ušabši belong to the realm of extispicy. Hence we do not know what competence, if any, corresponds to his use of that title.

The scribe of Text 19 is Mannu-iqâpu, 'exorcist of Anu and Antu', and very likely a son of Nidinti-Anu.[23] That Nidinti-Anu had a son called Mannu-iqâpu is confirmed by the mentioned legal act, BRM 2 31, which was written by 'Mannu-iqâpu, son of Nidinti-Anu, descendant of Ekur-zākir'. Text 19 contains a hymn, perhaps to Adad, which remains unedited. Text 21 is an omen text about encounters with a fox. According to the colophon it is the 38th excerpt of the series *Šumma ālu ina melê šakin,* 'When a city is positioned on a height'. Its scribe is also a Mannu-iqâpu, 'exorcist of Anu and Antu', but he appears to be a grandson of Nidinti-Anu.[24] This tablet is known to have been stored outside the Rēš, in the same private house where the library of the exorcist Iqīšâ was located.[25] Text 22 is a small fragment of an unidentified omen text. The badly damaged colophon mentions [NN]/Anu-bēlšunu//Ekur-zākir as the 'owner'. As suggested by R. Wallenfels[26], he may be our Nidinti-Anu, since no other Urukean scholar known to us matches this filiation. The scribe of the tablet is '[... son of] Nidintu-Anu, chief lamentation priest (*galamaḫḫu*)'.[27] I am not aware of any scholar who carried this title around SE 100, so he remains unidentified.

22 Anu-aḫa-ušabši/Kidin-Anu//Ekur-zākir (attested SE 0–85) and Šamaš-ēṭir/Ina-qibīt-Anu/Šibqat-Anu//Ekur-zākir (attested SE 110–120).

23 Less likely a grandson, if one assumes that one generation is missing from the 'owner's' filiation. Although the left part of the colophon is damaged, the filiation of the 'owners' appears to complete, i.e. that of Nidinti-Anu.

24 His filiation is given as ^{m}*Man-nu-i-qa-pu* A *ša*$_2$ ^{m}DUMU.A.NI, 'Mannu-iqâpu, son of his son'. The unexpected personal wedge in front of DUMU.A.NI (overlooked by Hunger, Spätbabylonische Texte aus Uruk 2, p. 146) may be explained as an error, since A *ša2* is usually followed by a personal name. Of course, if one assumes that A *ša2* is an erronenous insertion, than this Mannu-iqâpu is the son of Nidinti-Anu as in Text 19. Yet another Mannu-iqâpu, the son of Anu-aḫḫē-iddin/Anu-bēlšunu//Ekur-zākir (a brother of Nidinti-Anu) appears as a witness in the legal act TCL 13, 243 dated 29 VII SE 116 (Rutten, op. cit. 1935, p. 226–232; Pl. 2; Funck, op. cit.1984, 148–153).

25 For this library, 'Uruk 10' in Pedersén (op. cit. 1998), cf. Spätbabylonische Texte aus Uruk 1–5; Oelsner (Von Iqīšâ und einigen anderen spätgeborenen Babyloniern, in: S. Graziani (ed.), Studi sul Vicino Oriente Antico dedicati alla memoria di Luigi Cagni, Naples 2000 [= Istituto universitario orientale dipartimento di Studi Asiatici Series Minor 61], 797–814).

26 R. Wallenfels, Seleucid Archival Texts in the Harvard Semitic Museum, Groningen 1998 [= Cuneiform Monographs 12]

27 The clan name appears to be omitted, which is very unusual.

There is a gap of more than 6 years between Nidinti-Anu's last attestation as a scribe of scholarly tablets (Text 2), and his first attestation as an 'owner' of such tablets (Text 3). His transition from scribe to 'owner' must have occurred in between these dates. We cannot currently assess whether this might be correlated with an event in the biography of his father Anu-bēlšunu, since he is not attested. We may also look for a correlation between Nidinti-Anu's last attestation as an 'owner' and the careers of his sons. While Mannu-iqâpu is attested only as a scribe, Nidinti-Anu's had another son, Anu-aḫa-iddin, who was an 'exorcist of Anu and Antu' and a 'Big Brother of the Rēš', and 'owned' scholarly tablets. His earliest attestation as 'owner', in 26 XI SE 117,[28] is several years after his father's last attestation in that capacity. This phenomenon, which can be observed for other scholars as well, is compatible with the mentioned hypothesis that the transition to the 'owner' phase involves the assumption of a temple position, since these positions were often inherited from father to son.

Apart from his scholarly work, Nidinti-Anu was active as a notary, as evidenced by the numerous legal acts that were written by him. A discussion of the network of interactions that is implied by these acts is beyond the scope of the present investigation. He is thus far not attested as an active party in legal acts, unlike some of his colleagues. Hence we know nothing about his own economic transactions.

Although Nidinti-Anu is connected with the network of astronomers (Fig. 1), the content of the scholarly tablets (Table 1) suggests that he does not belong to the 'hard-core' astronomers – those who were active in the field of mathematical astronomy, and presumably observational astronomy. Indeed Nidinti-Anu does not use the traditional title of an astronomer, 'scribe of *Enūma Anu Enlil*' (*ṭupšar Enūma Anu Enlil*), but neither do many other astronomers.[29] In fact, among the 17 astronomers that make up the network only 4 are known to use that title, and of these only 2 are known to have been active in the field of mathematical astronomy.[30] Conversely, 7 astronomers who were active in the field of mathematical astronomy or Goal-Year astronomy do not seem to have carried the title 'scribe of *Enūma Anu Enlil*'.[31]

In my final remarks I want to reflect on the fact that the astronomical texts on which the reconstruction of the network in Fig. 1 is based are probably not representative for the astronomical corpus as a whole. As mentioned in the beginning, the evidence from Babylon suggests that observational texts constitute the bulk of the astronomical corpus. Although very few of these texts were found in Uruk,[32] this is probably a coincidence. It can

28 TCL 6, 15 + Archiv für Orientforschung 14, Tf 2 (BAK 93), a catalogue of the astrological omen series *Enūma Anu Enlil*.

29 For his biography cf. Ossendrijver (op. cit., in press).

30 Anu-bēlšunu//Sîn-lēqi-unninni and Šamaš-ēṭir/Ina-qibīt-Anu/Šibqat-Anu//Ekurzākir.

31 Anu-balāssu-iqbi/Nidinti-Anu/Anu-bēlšunu//Sîn-lēqi-unninni, Ina-qibīt-Anu/Anu-aḫa-ušabši//Ekur-zākir and his two sons Anu-aḫa-ušabši and Anu-uballiṭ, and Nidinti-Anu//Ḫunzû and his son Anu-uballiṭ.

32 Diaries: ADRT I –463 (= W 20030,142; excavated in room 79b of the Rēš); planetary observations:

be assumed that the astronomers of the Rēš, like their colleagues in Babylon, carried out regular observations, and wrote astronomical diaries and related texts. Hence the actual number of collaborations (linkages) between the astronomers is certainly far greater than in Fig. 1. However, we can be confident that many of the astronomers in Uruk who carried out observations were also active in the field of mathematical astronomy, because this was expected from their colleagues in Babylon. Since the tablets of mathematical astronomy usually mention an 'owner' and a scribe, many of the astronomers who wrote observational texts may already be represented in the network of Fig. 1. We may therefore have some confidence that, in spite of the lack of observational texts, the actual size of the network of the astronomers in Uruk may not be fundamentally different from this reconstruction.

T.G. Pinches/J.N. Strassmaier /A. Sachs, Late Babylonian Astronomical and Related Texts, Providence 1955: 1377 (= A 3456; Hunger, Fs Sachs, 201–223); ADRT V 42, V 82; Normal-Star Almanacs (to appear in a future volume of ADRT): Pinches/Strassmaier/Sachs (op. cit.): 1004*, 1025*, 1030*a, 1031*, 1032*; Almanacs (to appear in a future volume of ADRT): Pinches/Strassmaier/Sachs (op. cit.): 1124*.