Embryology in the ʿAjā'ib al-Makhlūqāt of Zakariyā b. Muḥammad b. Maḥmūd al-Qazwīnī

scriptie in het kader van het
doctoraal examen Arabische,
Nieuw Perzische en Turkse Taal
en Letterkunde aan de
Rijks Universiteit Utrecht,
vakgroep Oosterse Talen en Culturen,
afdeling Nabije Oosten,
sectie Arabisch

Utrecht, januari 1985

Jan Jaap de Ruiter

'la nature, ce dieu féroce et taciturne'

Paul Verlaine, 'Circonspection'

Table of Contents

Voorwoord

Deze scriptie is geschreven in het kader van het doctoraal examen Arabische, Nieuw Perzische en Turkse Taal- en Letterkunde aan de Rijks Universiteit Utrecht.
Aarzelend ben ik eraan begonnen maar in de loop van het onderzoek bleek het onderwerp dermate interessant dat ik de meeste tijd met plezier eraan heb gewerkt. Dat is wellicht ook de reden dat het geheel wat groter is geworden dan gepland.
Een scriptie schrijven is als een zwangerschap. Er staat een periode voor en hoe verder je in die periode bent, hoe spannender alles wordt: je verlangt naar het eindresultaat. Gelukkig ben je niet alleen.
Daarom mijn grote dank aan mijn begeleidster mevr. Dr. Remke Kruk voor haar constante hulp en warme aandacht. Ook wil ik mijn grote bewondering uitspreken voor de nauwgezette correctie van de tekst door Margo en het enorme geduld van de typist John.
Tenslotte kan ik het niet nalaten mijn vriend Bart te vermelden zonder wie mijn leven tijdens mijn afstudeerperiode heel wat saaier zou zijn geweest.

Utrecht, januari 1985
Jan Jaap de Ruiter

Introduction

This thesis deals with the embryology in the ʿAjāʾib al-makhlūqāt, the cosmography of Zakariyā b. Muḥammad b. Maḥmūd al-Qazwīnī (± 1200 - 1283 AD / ± 600 - 682 H). All three notions in the title: the embryology, the ʿAjāʾib al-makhlūqāt and the author Qazwīnī will be discussed, but in a different order. The first two chapters deal with the author, the cosmography and its textual history and the last two chapters deal with the embryology in it. All chapters have separate tables of contents at the beginning and lists of works cited at the end (except for chapter 3).
Chapter 1 is divided into two parts. Part A gives information on Qazwīnī's life and works. It has a rather historical character and serves as an all-round introduction to the rest of this thesis. In it some indistinctnesses are solved concerning Qazwīnī's name, the dating of his works and his life. Part B introduces his whole cosmography, judgements on it and other cosmographies.
Chapter 2 gives a deep insight into the complicated matter of the history of the diverse manuscripts and editions of the ʿAjāʾib al-makhlūqāt. It is the first time that some deeper research is done on the Munich Codex 464 of the ʿAjāʾib al-makhlūqāt and the results are some surprising discoveries in the history of the text.
Chapter 3 is in fact the kernel of this thesis. It is the translation of Qazwīnī's embryology. After it chapter 4 follows which consists of the analysis of the embryology (A) and the main points one can detect in the sometimes chaotic text of the embryology. Part B presents the results of the tracing of these main points. Striking is the enormous quantity of Greek sources in it: Hippocrates, Aristotle and Galen. Here one finds an example of Greek knowledge filtered through into the Islamic world.

SYSTEM OF TRANSLITERATION OF ARABIC CHARACTERS :

consonants:

ء	'
ب	b
ت	t
ث	th
ج	j
ح	h.
خ	kh
د	d
ذ	dh
ر	r
ز	z
س	s
ش	sh
ص	s.
ض	d.
ط	t.
ظ	z.
ع	c
غ	ġ
ف	f
ق	q
ك	k
ل	l
م	m
ن	n
ه	h
و	w
ي	y

long vowels:

ا ى	ā
و	ū
ي	ī

short vowels:

ـَ	a
ـُ	u
ـِ	i

diphthongs

ـَو	aw
ـَي	ay
ـِيّ	iyy (final form)
ـُوّ	uww (final form)

ة a ; at (construct state)

The ل of the article conforms with a following antero-palatal in transliterated texts but remains an l in loose names. (al- Takrūrī)

Chapter 1

Table of Contents

Part A: LIFE AND WORKS OF QAZWĪNĪ

1.1. Introduction.

In this chapter we will try to establish as many facts as possible on Qazwīnī's life and works. For this we will go back to autobiographical material; to the oldest possible sources on him and modern research (that is from ± 1800). Due to my not having been able to consult all manuscripts we will have to lean on the authority of others which will however be looked upon critically.

1.1.1. Qazwīnī's name.

In the oldest known codex, M (see chapter 2) Qazwīnī is represented as: Zakariyā b. Muḥammad b. Maḥmūd al-Kamūni al-Qazwīnī [1] and the same name can be read in the preface of manuscript C [*] as well.[2] However, many variants can be found in younger manuscripts. The multitude of his names is just as large and varied as the multitude of copies of his works. Ḥājjī Khalīfa calls him al-Kūfī instead of al-Kamūnī [3] and de Chézy lists a great variety of Qazwīnī's names which he took from different manuscripts. In the 'Bibliothèque du Roi' de Chézy found several manuscripts of Qazwīnī's ʿAjā'ib al-Makhlūqāt and Āthār al-Buldān of which no.898 is the best one. There Qazwīnī is called: Muḥammad b. Muḥammad al-Qazwīnī [4] but in most of the other manuscripts he consulted he found his name as: Zakariyā son of Mohammed, son of Mahmud.[5] Also in the margin thext of the ʿAjā'ib in al-Damīrī's Kitāb al-ḥayawān (D) he is called Zakariyā b. Mohammad b. Maḥmūd al-Qazwīnī [6] as he is called in Reinaud's text (R)[7] (See Chapter 2.2) Thus, as the name 'Zakariya son of Mohammed son of Mahmud' seems to be the most frequently used and oldest we will stick to it and leave out the many variants of his ancestor's names which de Chézy mentions. Very interesting are the facts about his first nisba: al-Kamūnī, found in both M and C [**] but not mentioned in the EI.[8] Ḥājjī Khalīfa, as was already said, has the al-Kūfī variant. In the Persian manuscript no.141 of the Bibliothéque du Roi he is called al-Kamūnī and in no.142 his nisba is al-Kūnī.[9] But again we will stick to our -M- and preface -C- variant: al-Kamūnī.

[*] The manuscript Wüstenfeld used in his edition for the introductions of the ʿAjā'ib (see chapter 2.1.1.)

[**] However C has 'al-Maymūnī' in its title according to the Gotha catalogue.[14] Probably there is a difference in title and preface.

As all sources are uniform on his second nisba al-Qazwīnī *) we will not do any research on that name. According to Abū l-Maḥāsin Ibn Taġribirdī whose work [10] I was unable to consult but to whom de Chézy refers as he spends some lines on Qazwīnī,[11] Qazwīnī had the 'prénom' Abū Yaḥyā, which we also find in the EI [12] but not in M, C and Ḥājjī Khalīfa. De Chézy supposes that it might be a variant of 'Ibn ᶜAbd Allāh.' He found this name in a manuscript of Qazwīnī but he fails to mention its title. (Manuscript no.8 Bibliothèque du Roi)[13] All these different variants of Qazwīnī's names can easily be explained from copyists' errors. Maḥmūd turns into Muḥammad and al-Kamūnī into al-Kūfī or al-Kūnī. We will however pass 'Abū Yaḥyā' as it is only mentioned by Ibn Taġribirdī and (how?) in the EI but not in C and M.
Ibn Taġribirdī also gives him an honorific title: ᶜImād al-Dīn, found in M as: ᶜImād al-Dunyā wa- l-Dīn as well but not in C. M however gives him many more honorific titles: mawlā an-niᶜam as-ṣadr al- muᶜaẓẓam al-kāmil, al-ᶜallām, muftī l-firaq and ra'īs al-aṣḥāb, all names that have to do with his high religious position, of which one can be found in Ibn Taġribirdī's notes on him. We will leave them for what they are and regard them as belonging to his position. Ibn Taġribirdī also names him al-Anṣārī because he is supposed to descend from an Arab family in Medina, about which more in the next chapter.

1.1.2. Qazwīnī's descent.

M as well as C mention Qazwīnī's descent as being from one of the jurisprudents (fuqahā') who settled down in Qazwīn and whose descent goes back to Ānas b. Mālik (d.c.91-93 H/ 709-11 AD),[15] one of the famous jurisprudents after whom the Maliki-school is named, one of the four schools of jurisprudence in Islam. This Ānas b. Mālik came from Medina and the followers of the prophet Mohammed from this city are called the 'anṣār', helpers, and thus it need not surprise us that Ibn Tagribirdī, called Qazwīnī al-'anṣārī: belonging to the 'helpers'. al-Damīrī gives us the same information as M and C do.[16] In his Āthār al- bilād wa-akhbār al-ᶜibād Qazwīnī gives us some autobiographical information on his descent: There, in his description of Qazwīn,[17] he mentions "the coming of shaykh Abū-l-Qasim Ibn Hibat Allāh al-Kamūnī (and not al-Qazwīnī as the EI says [18]), a learned man, descendant of Ānas b. Mālik of whom is said that he came in his time as a governor,

*) In mentioning his name we say normally Qazwīnī but in the context of his whole name 'al-Qazwīnī'.

prefect (wālī) in Qazwīn," and "who is in fact my fifth grandfather in line." We see that the nisba al-Kamūnī seems to come from his family and that later on automatically a new one was added: al-Qazwīnī. This explains the name al-Kamūnī in M and C. We will on the grounds of these facts accept his genealogy. As his family had been living for a long time in Qazwīn where Persian is the native language it is probable that his native language was Persian. The EI adds to that that "judging from certain solecisms to be found in Qazwīnī's works, Arabic does not seem to have been his mother tongue." [19]

1.1.3. The dating of Qazwīnī's works.

So as to get a good view on the chronological order of Qazwīnī's life we will first try to establish the years in which he wrote his works. After that we will fill out his life with facts on his travelling, the meeting of certain people and the functions he held. We will start with Qazwīnī's "Geography" of which two versions were made during his life. The oldest is entitled "ʿAjā'ib al-buldān", "Marvels of the Countries." Hājjī Khalīfa holds that it was composed in 661 H/ 1262-3 AD.[20] The second version which is completely revised dates from 674 H/ 1275-6 AD according to Hājjī Khalīfa [21] and was called "Āthār al-bilād wa-akhbār al-ʿibād" "Monuments of the countries and History of their Inhabitants." Michael Casiri in his catalogue of the library of the Escurial which contains a copy of the "Marvels" dates it at 661 H/ 1262-3 AD as well.[22] Reinaud then, in his 'Introduction' alleges that the ʿAjā'ib al-buldān are of a later date than the Āthār because the ʿAjā'ib contain autobiographical information.[23] Actually the opposite is true: the Āthār contain autobiographical information and the argument used by Reinaud that the ʿAjā'ib al-buldān are more elaborate than the Āthār is also valid to date the Āthār later than the ʿAjā'ib al-buldān. Therfore we stick to Hājjī Khalīfa and Casiri:

1) the ʿAjā'ib al-buldān written in 661 H / 1262-3 AD

2) the Āthār al-bilād written in 674 H / 1275-6 AD

As we have dated our ʿAjā'ib al-makhlūqāt at 768 H / 1279-80 AD*) we can surely conclude that Qazwīnī's writing activities date from the last part of his life. It is self-evident that the first variant**) of the ʿAjā'ib al-Makhlūqāt cannot be dated as no fitting copy of it has come to us but it seems probable that it is from Qazwīnī's period as author

*) for this dating see chapter 2.2.
**) see note *) on page 7

as well, taking into account his writing activities. Thus, Qazwīnī became an author in the last part of his life. According to Ibn Taġribirdi he died on the 7th Moharram 682 H / 7th April 1283 AD.[24] [25]

1.1.4. Qazwini's life.

As his nisba indicates Qazwīnī comes from Qazwīn, a city situated North West of and not far from Teheran. The earliest date known about Qazwīnī's life we owe to Qazwīnī himself: in his Āthār he tells us that he met the well-known philosopher and mystic Ibn al-ʿArabī Muḥī l-Dīn in Damascus in 630 H / 1232 AD.[26] Ibn al-ʿArabī died in 638 H / 1240 AD. Ibn al-ʿArabī settled in Damascus in 627 H / 1230 AD and had been living there from that time on.[27] Further de Chézy mentions the remark on Qazwīnī which he found in ms. 397, ʿAjā'ib al-buldān of the Saint-Germain-des-Prés library where it says that Qazwīnī was a pupil of Athīr al-Dīn al-Abharī, the writer and philosopher.[28] De Chézy places al-Abharī's death around 630 H / 1232 AD or later. Al-Abharī however died in 663 H /1264 AD.[29] De Chézy is the only one who mentions this.

Reinaud read in an Arabic manuscript which title he does not mention (a manuscript of the Bibliothèque Royale suppl. 917 fol. 7) [30] about Qazwīnī meeting with Diyā' al-Dīn Abū l-Fatḥ Naṣr Allāh Ibn al-Athīr one of the three brothers Ibn al-Athīr, probably in Mosul. This Diyā' al-Dīn lived in Mosul from 618 H/1221 AD until the end of his life (637 H/ 1239 AD).[31] In his Āthār, on his description of Mosul Qazwīnī mentions his meeting with an old very learned man, a shaykh named Kamāl al-Dīn Ibn Yūnis.[32] Both men were at that time old and learned and probably both lived in Mosul. But the fatner of Diyā' al-Dīn was not named Yūnis.[33] It all goes to far for us to say that Kamāl al-Dīn and Diyā' al-Dīn are one and the same person. We will not pursue the matter of this meeting any further.

In his Athār Qazwīnī relates his travelling to Jannāba [34] a region in modern Eastern Iran; to the Jabal Sāwa [35] in the region of 'Quhistan', probably the modern Kurdistan and to Sanābādh, a village near Tūs. Later on he mentions that when he was in Mosul he went from there to ash-Sha'm (Syria).[36] Casiri tells us that Qazwīnī would have travelled in most parts of Persia, Asia and Africa.[37] Reinaud denies that as far as Asia and Africa are concerned. [38] We follow him in this respect because if Qazwīnī visited a place he seems more likely to mention it than to keep it quiet and of the parts he visited he gives far more detailed accounts than the parts he did not visit,

in this case Africa and Asia. M. Kowalska, who investigated the sources of Qazwīnī's Āthār,[39] from which appears that Qazwīnī copied many predecessors of his on geographical knowledge (see 1.1.5. as well) mentions that a " considerable number of descriptions of towns from the region of Qazwīn, Jīlān, Tabaristān, Adharbayjān and of Armenia, Syria and probably Asia Minor, ᶜIrāq, al-Jazīra, Fars, i.e. of the territories where Qazwīnī spent his life, do not contain any borrowings from the writers known to us. It may be possible that this is at least to some extent the original achievement of Qazwīnī as a traveller." All the places that Kowalska mentions lie more or less in the regions mentioned by our sources that Qazwīnī would have visited. Her notion seems to confirm our sources and thus we will adhere to the idea that Qazwīnī travelled in the Middle East and Iran.

An important fact on Qazwīnī's life is what Ibn Taġribirdī tells us: "he was Qādī in Wāsiṭ and al-Ḥilla (two cities not far from Baghdad, (south-east of it) in the time of the Caliph. He was a learned imām and a jurisprudent (faqīh)" [40] R also mentions his position as Qādī: " al-qazwīnī.....qādī wāsiṭ ᶜirāq....." [41] but as the status of R is rather feeble: we will not lean on it too much. The caliph was probably al-Mustaᶜsim: he reigned from 640 - 656H / 1242 -1258 AD. Around 640 H/ 1242 AD Qazwīnī was probably still travelling, or just about to end his travels if we take our information on him in consideration (see down). Thus Qazwīnī was Qādi under al-Mustaᶜsim. In this period Qazwīnī tells us that he met the philologist and geographer Saᶜīd b. ᶜAbd al-Raḥmān al-Andalūsī (al-Ġarnāṭī) [42] of whom is known that he went to the East in 656 H / 1250 AD.[43] This will probably have happened before 656 H / 1258 AD, the year that the Mongols rushed into Iraq and seized power, which meant the collaps of the Abbasid Caliphate. It was after these events that Qazwīnī retired from public life as can repeatedly read in the manuscripts; from then on, he lived in exile, M says: balītu bi-buᶜd ad-dar wa-l-waṭan wa-mufāraqat al-ahl wa-ssukn.[44] C says: ḥakima allāh ᶜalayya bi-buᶜd ad-dār wa-l-waṭan wa-mufāraqat al-ahl wa-ssukn[45] and D mentions the same as C does.[46] He was seperated from house and family and far from home and native country. And it was in this period that he could - finally?- devote himself to his writing activities. M: ".....I wanted to record the astonishing signs of wisdom I had obtained through my observations. I would not like it to be forgotten." [47] It is in this last period (1258 - 1283 AD / 656 - 682 H) that he wrote his works among which the first version of the ᶜAjā'ib al-Makhlūqāt.

Let us assume the following reconstruction: he wrote the ʿAjāʾib al-Buldān in 661 H / 1262-3 AD, the Āthār-al-bilād in 674 H / 1275-6 AD and his ʿAjāʾib al-Makhlūqāt in 678 H / 1279-80 AD. The Āthār are a revision of the ʿAjāʾib al-Buldān and the ʿAjāʾib al-Makhlūqāt of 678 H 1279-80 AD is a second variant. (see chapter 2.1.) *) We may easily suppose that the first variant of the ʿAjāʾib was written between 661H/ 1262-3 AD and 674 H / 1275-6 AD. After having revised his Buldān Qazwīnī decided later to revise his ʿAjāʾib al-Makhlūqāt as well. In 661 H/1262 AD al-Juwaynī, the Persian historian, became governor of Baghdād on behalf of Hālāgā and his successor Abāka. A dedication to him can be read in the B and C manuscripts [48] but not in their original M (the so-called original variant Two) *) It is not impossible that Qazwīnī found a Maecenas in him as the EI suggests.[40] As already mentioned Qazwīnī died on the seventh Moharram 682 H which is the equivalent of the seventh of April 1283 AD.[50]
Given all these facts we may add to it the missing information, such as his date of birth. He may have been a pupil of al-Abharī who died in 663 H / 1264 AD. In 630 H / 1232 AD he was in Damuscus. Probably he travelled to Damascus via Mosul, a very common route in those times. Ibn al-ʿArabī died in 632 H / 1234 AD. So if he met Kamāl al-Dīn Ibn Yūnis on this same trip it must have been before 632 H / 1234 AD. We may presume that after this date until about 640 H / 1242 AD he travelled in the territory of Persia keeping Qazwīn, his beloved native town as a centre for about ten years. After 640 H/1242 AD he became Qādī in Wāsit and al-Hilla but he resigned after the invasion of the Mongols. For the rest of his life he has lived in Iraq, under the protection of its governor ʿAlā al-Dīn Atā Mulk al-Juwaynī and probably in the town of Wāsit where the copyist and physician al-Dimashqī wrote the second variant of his ʿAjāʾib al-Makhlūqāt.[51] Considering these facts I presume that Qazwīnī was born in the beginning of the seventh century of the Hijra.**) After having been a pupil of al-Abharī he went to Mosul and Damascus as a young man, very likely via Baghdād, still a centre of religion, culture and power. Then travelling for about ten years, satisfying his interest in and admiration for the marvels of creation

*) Chapter 2 gives the argumentation for the existence of four variants of the ʿAjāʾib al-Makhlūqāt of which the first two were written during Qazwini's life.

**) Zirikli presumes he was born in 605 H / 1208 AD.[52]

and miraculous aspects of existing things "he was summoned to Iraq to take on a high religious position and in the end he was able to put down what he had seen, heard, studied and contemplated in his works. We can also conclude that Qazwīnī had had a legal training very likely already in his youth, a logical choice for a descendant of the famous jurisprudent Ānas b. Mālik. He may have obtained fame as a Qādi during the years 632 - 640 H / 1234 -1242 AD travelling but also holding a religious position in Qazwīn, and this may have been the reason for his being summoned to Iraq.
Qazwīni was a learned and respected man. The facts of his life suggest an honest, curious, not too critical, loving man, very likely popular with the people and supported by the authorities. His works,judging by the many existing copies of it have always been very popular and widely spread; the contents were interesting, and the books were made easy reading.

1.1.5. The works of Qazwīnī.

As the Cosmography will be dealt with in Part B, we will limit ourselves here to a summary of the rest of Qazwīnī's works. First of all there is his Geography, in two versions: the ʿAjā'ib al-Buldān, dated 661 H / 1262-3 AD and the Āthār al-bilād wa-akhbār al-ʿibād, dated 674 H / 1275-6 AD. The description of the earth in it follows the division into seven climates. The cities, countries, mountains, rivers etc. situated in each of these climates are described in alphabetical order. The description of each city or country contains geographic and historical facts and also biographical data on famous personalities originating from these places. Important is that certain articles of the Geography concerning certain mountains, rivers etc. can also be found in the Cosmography, often with exactly the same tenor. This may be an indication that the Cosmography was written after the Geography: the Cosmography 'borrowed' the data from the Geography for the description of mountains and rivers in it. The same argument however may be used in favor of the dating of the Cosmography before the Geography. On the sources of the Āthār al-bilād M. Kowalska published a thorough study.[53] There it appears that nearly 360 articles out of the ca.600 which form the total of al-Qazwīnī's geographical dictionary contain data borrowed from the Muʿjam al-Buldān of Yāqūt (575 - 627 H / 1179 -1229 AD), and that a very considerable part of these 360 articles contain nothing but extracts from Yāqūt's work. Furthermore she showed the existence of many other quotations from other geographers. The work

appears to be a compilation of other geographers' work, was rather popular and widely used.

Examining the works Qazwīnī wrote we find de Chézy [54] telling us that according to d'Herbelot in his 'Bibliothèque orientale'[55] a History of Qazwīn should be attributed to Qazwīnī as well: 'Irshād fī-akhbār qazwīn.' However this fact is not found in the Bibliothèque Orientale and one wonders whether de Chézy really consulted the work of d'Herbelot- as it is not the only time that he refers to it - because after having consulted it myself I could not find his other references to it either -. However, de Chézy thinks it possible that Qazwīnī wrote such a work. We leave this aside as we have absolutely no proof. In an undated edition of Qazwīnī's cosmography, printed in Cairo [56] and found in the library of the Institut Dominicain des Etudes orientales, Dr. Jamāl al-Dīn al-Ramādī refers in his introduction to the discovery of father Louïs Cheïkho S.J. who allegedly found a work on the history of Cairo and who attributed it to Qazwīnī. Dr. al-Ramādī referred for it to the magazine al-Mashriq (1905) [57] and it did in fact contain the following information: Father Cheïkho travelled to Aleppo for scholarly purposes. In Aleppo's library he found "a history of Egypt and Cairo, not mentioned at all in any library and attributed to Qazwīnī although title as well as name of the author are erased and rewritten in another handwriting on the second page." Cheïkho considers it an excellent description of Cairo. It starts with its foundation through the Fatimids (349 H/ 960 AD) It is in the style of al-Maqrīzī (766-846 H / 1364-1442 AD) he says. From it, Cheïkho quotes the description of the Library of Cairo. It is written in a narrative form. It is interesting in this respect that Ziriklī tells us that Qazwīnī wrote a book called Khitat misr,[58] without however stating where he obtained this information. However interesting this may be, it hardly seems probable that Qazwīnī wrote these works. To be able to give 'an excellent description' of Egypt and Cairo it would have been necessary for Qazwīnī to visit Cairo but this is nowhere mentioned for a fact. Subsequently, the narrative form is not his usual style. Moreover, there are so many manuscripts of Qazwīnī's Geography and Cosmography which deal with so many subjects that it must be very tempting to attribute to him a work of the kind Cheïkho found. Therfore we will leave it for what it is.

Part B: CAZWĪNĪ'S COSMOGRAPHY

1.2. Introduction.

The beginning of the ʿAjā'ib al-Makhlūqāt consists of a preface followed by four introductions. These four introductions explain the four notions hidden in the title of the work: "ʿAjā'ib al-Makhlūqāt wa-Ġarā'ib al-Mawjūdāt" "Wonders of things created and miraculous aspects of things existing.[59]" The four introductions explain the ʿajab, the makhlūqāt, the ġarīb and the mawjūdāt. For this discussion of Qazwīnī's Cosmography we will use the M-codex, which has a high status in our investigations. (see chapter 2.4.2.)

1.2.1. Preface and Introductions.[60]

The Preface (M fol. 2a.1 - 3a.13)

After the eulogy to God and the recognition that he is the creator of everything his blessings are implored especially on his Messenger, the prophet Mohammed. Then the author focuses his attention on himself, Zakariya son of Mohammed, son of Mahmud al-Kamūnī al Qazwīnī. He who descends from the famous jurisprudent Ānas b. Mālik. He is separated from home and native country and started writing out of boredom with his situation of exile. "For everything around us makes us marvel." According to the prophet's word: "Reflect on God's creation." [61] Qazwīnī has reflected and has come to realize that man is incapable of comprehending divine wisdom in everything but he wanted the things he had seen, heard and reflected on recorded so that they would be preserved and not be lost. Finishing his preface Qazwīnī points out that the prodigies whether one can actually see them with the eyes or just observe them in a metaphysical way are all God's work. There are peculiarities in creation about the true existence of which one can have doubts but in that case Qazwīnī recommends his readers to test the truth of the given fact and at the same time to take a positive attitude:

" lā tansā l-fadla baynakum
" fa-laysa tarā ʿaynu l-karīmi sawī l-hasani

" Do not forget the excellent things among you
" Does not the eye of the noble-minded see what is superiour only ?

The first introduction, " on the explanation of ʿajab " *) (M fol.3a.13 - 5b.21)

ʿAjā'ib are things which, by their very nature bring men in a condition of perplexity, because man can not get to know first causes of things or the way things impress him." Qazwīnī mentions as an example the activities of bees: a very complex phenomenon. All together are in apparent chaos, they appear unorganized, but even so the bees produce their delightful honey in their finely built honeycombs: a marvel of creation. Many phenomena in nature, the universe, animals, plants, the world, their functioning: all these things astonish, amaze the soul of the sagacious. It leads man in a condition of ʿajab, as God, the Exalted has said: "Say, look what is in the heavens and on earth. Let him (man) look at the seas, he does not know its shores, its ends nor its beginnings: only God knows them, he who leads to what is right."[62)]

The second introduction: "on the division of things created" (M fol.5b.21 - 6b.1)

"We understand by makhlūq (passive participle of 'khalaqa'=created) everything that is existent outside God, praised be he." And what a lot there is ! All created things are arranged first of all according to their dependency or independency and then according to the rules of matter, time, relationship(s), functions, qualities, conditions, senses and many more aspects of existence, in short: "fa-hādhihi jumlat aqsām al mumkināt": all these factors are the possible elements created things may consist of. In these all makhlūqāt find their existence, being created by God, the creator.

The third introduction: " on the meaning of ġarīb" (M fol. 6b.2 - 7b.20)

"Ġarīb is everything that does not occur often and that is contrary to custom and familiar observations. Such astonishing things originate from the influence of strong souls, celestial bodies or elementary bodies, and all that with God's power and will." Examples are: the miracles performed

*) Remarkable is that as the singular of ʿAjā'ib is ʿajība. Qazwīnī though uses the word ʿajab, which has a plural 'aʿjāb. This ʿajab has a much wider meaning: it is the notion, the idea, whereas ʿajība is the case, the situation in which the ʿajab happens. Thus it is not unlogical that Qazwīnī used ʿajab instead of ʿajība. He is concerned about the notion.

by the prophets; the receding of the water of the sea. Or the miracles of saints: their healing the sick. But fortune telling too, and the miracles of nature are a kind of ġarā'ib; for instance the raining of stones. Or the strange appearances of the human being having a bipartite half of the body. "The philosophers divide the ġarā'ib into three kinds," Qazwīnī says. First there are the effects that originate from souls without physical power: If these effects are of a good nature you can see them in the miracles of the prophets. If they are evil you can see them in the magic of the jinns. The second kind is caused by powers of heaven and elementary bodies that express themselves in typical constructions, forms and positions, an example of these are amulets. The third kind are the influences of earthly forces such as magnetism. "Everything will be dealt with with God's permission."

The fourth introduction: "on the division of the things existing."(M fol. 7b.21-8a.12)

"Everything that exists (mawjūd, the passive particiciple of wajada = existing) outside the Essential, praised be He, is his creation and his making." One might say, the thing that is makhlūq, created, is mawjūd, existent. And of course there are many existing things, innumerable ones in fact, observable with the eyes, such as sky and earth or not observable with the eyes: the angels, the jinns. All with their particular qualities, forms and characteristics. It is impossible to comprehend it all. "For no atom moves in the heavens or on earth or in its motion is one, two, ten or a thousand signs of his wisdom." All this is proof of the unity of its creator, his power, his grandeur and his greatness as (the poet) said:[63]

"wa-llāhi fī kulli taḥrīkihi wa-taskīnihi 'abdā shāhiduhu
"wa-fī kulli shay'in lahu āyatun tadallu ᶜalā annahu wāḥidu

"By God! In every calming or stirring motion he makes, his testimony is revealed
"For in everything related to him is a sign that indicates that he is one.

Concluding our survey on preface and introductions we may say that something that is created has in it the notion that it has just been completed by its creator. This newly created thing is received with an elementary, primary astonishment, an ᶜajab from the part of man. If the created thing is there, it exists, it is mawjūd and then sometimes it appears to have strange, peculiar qualities: again one is amazed about

it, but differently: the amazement as an ʿajab is about something that is natural, whereas ġarīb is something one is astonished about because of its deviating and rather unnatural character. Makhlūqāt cause ʿajab and in mawjūdāt one may discover ġarā'ib.
On the notion ʿajā'ib we may quote Dubler in his article ' ADJĀ'IB ' in the Encyclopaedia of Islam [64] who says that: " ʿadjā'ib are in the first place the marvels of antiquity. In addition, the term and its derivatives comprise, already in the Kur'ān, the marvels of God's creation". ʿAdjā'ib are thus any kind of casual data about extraordinary monuments, the three realms of nature and meteorological phenomena."
For us it goes too far to analyse Qazwīnī's ʿajā'ib completely but the idea that ʿajā'ib have a Koranic background too can be found in Qazwīnī as well: ʿajā'ib are closely connected with makhlūqāt.

1.2.2. The Contents.

The table of contents of M corresponds largely with its contents and thus we will give a general idea of its contents in this little chapter.
The work is divided into two parts,[65] the first of which deals with supraterrestial things, and the second with terrestrial ones. In the first part the author describes celestial phenomena, i.e. the moon, the sun, the stars and then speaks of the inhabitants of heaven, the angels. At the end of this part he explains the problems of chronology and of the Arabic and Syrian calendars. The second part begins with a treatise on the four elements, the meteors and the winds. The author then describes the division of the earth into seven climates and gives a description of all the known seas and rivers. Having explained the causes of earthquakes and of the formation of mountains and wells, he passes in review the three kingdoms of nature: the mineral, the vegetable and the animal. The description of the animal kingdom is preceded by one of man, his character and anatomy and by a characteristic of human tribes. All other living beings are discussed after jinns and ghūls have been dealt with. The embryology belonging between the chapters on character and anatomy is taken from the A-manuscript as it can not be found in M (See chapter 2). Our manuscript is beautifully illustrated with i.a. geometrical tables and miniatures representing plants, animals and various monsters. Remarkable is the picture of human beings and animals something forbidden in Islam !

1.2.3. The appreciation of Qazwīnī's works.

To give an idea of the modern appreciation of Qazwīnī's writing labour we will quote modern researchers on him. As we have limited ourselves to Qazwīnī's embryology we will refrain from a judgement on his work as a whole. However we will present a thorough criticism of his embryology (see chapter 4).

T. Lewicki calls Qazwīnī's Cosmography 'the first systematic exposition of cosmography in Muslim literature' in his article on him in the Encyclopaedia of Islam.[66] In this he corresponds with Dubler's view who in his article 'Ajā'ib' in the same encyclopaedia calls Qazwīnī "the greatest author of the period of the full development of the ʿajā'ib." [67] Lewicki continues by praising the many-sidedness of Qazwīnī's knowledge and his clear, simple language, but 'his principal merit lies in having accomplished the raising of cosmography to a literary genre of an extremely high level.' [68] Mieli in his 'La science arabe' calls the ʿAjā'ib 'une compilation (d'ailleurs) très intéressante pour nous.' [69] Reinaud, in his Introduction alleges that "the writings of Qazwīnī, although imperfect in themselves give a distinct idea of his scholarship." [70] And with this remark of Reinaud we find ourselves in the area of criticism of Qazwīnī: his lack of originality. As Kračkovskij poses: His style is clear, his knowledge extensive, but he copies a lot from his predecessors.[71] But, his works are on such a level that Qazwīnī may be compared to Herodotus or Pliny: the Pliny of the Orientals as Streck tells us.[72] De Chézy is ambivalent in his view on the ʿAjā'ib as well. On the chapter of 'the water' (the seas, the islands and the fish) he says: 'La plupart de ces descriptions sont puériles et fabuleuses.' [73] But on his natural history he argues that: 'cet ouvrage, qui malgré ses défauts, me semble être cependant le meilleur Traité d'histoire naturelle qu'aient les orientaux' ![74] Casiri, in his catalogue, stresses that Qazwīnī mentioned every important detail in his Āthār: "nihil denique sibi praetermittendum omnino duxit aut risudignum, aut scitu, aut memoratu" [75] Severe criticism comes from von Grunebaum who quotes two passages from the ʿAjā'ib al-makhlūqāt in his 'medieval Islam' to illustrate the decline of critical science in the 7th/13th century.[76] M. Kowalska doing research on Qazwīnī's Āthār calls him an amateur geographer.....(who) selected the available data rather uncritically often in a quite accidental way." "He has plagiarized the writing of the older geographers and historians." [77] And Lewicki in the EI affirms that this impression (i.e. the plagiarism) can not be resisted.[78] In short, it is his lack of originality and his uncritical

mentioning of all kinds of ʿajā'ib (wonder stories) that is mostly criticized. On these ʿajā'ib however, Kowalska remarks in another article that [79] the Cosmography is an all-round work, with a comprehensive hypothesis: a description of the cosmos; that means everything. And to everything belong the unexplainable ʿajā'ib and ġarā'ib as well. Concluding our survey we may refer to al-Masʿūdī, the famous geographer/historian who says about wonder-stories that "they are not completely impossible, nor are we obliged to believe them. They belong to the category of what is possible and admissable." "Many reject them but we nevertheless mention them."[80] It is as Einstein has said, quoted by Kowalska: "Wer sich nicht wundern und begeistern kann, ist ein toter Mensch: seine Augen sind erloschen."

1.2.4. Other Cosmographies and their relation to Qazwīnī's.

The Tuḥfat al-albāb of Abū Ḥāmid al-Ġarnāti al-Māzinī [81] (473-566 H/1080 - 1169-70 AD), the "precursor of the popular cosmographers" as Dubler calls him [82] is considered as the first cosmographical work. It is cited by Qazwīnī many times under the title 'Kitāb al-ʿajā'ib.[83] Important as well is the work of the Persian author Aḥmad Tūsī (d.±1180), the ʿAgā'ib al-maḫlūqāt, only known from manuscripts.[84] Kračkovskij, however mentions similarities between Aḥmad Tūsī and Qazwīnī.[85] An anonymous work with the title: Tuḥfat al-ġarā'ib is cited many times by Qazwīnī.[86] This work should not be confused with the Tuḥfat al-ʿajā'ib wa-ṭurfat al-ġarā'ib which is younger than Qazwīnī's ʿAjā'ib al-makhlūqāt (see down)(on this work see:Kowalska,M. 'Remarks on the unidentified cosmography Tuḥfat al-ġarā'ib' in Folia Orientalia IX (Krakow 1967) 11-18) The climax of Cosmography is clearly situated in the work of Qazwīnī.[87] After him a complete school [88] of cosmographers follow of whom we mention the Nuḫbat ad-dahr fī ʿajā'ib al-barr wa-l-baḥr of al-Dimashqī (654-728 H/1256-1327 AD)[89] who leans heavily on Qazwīnī's cosmography and the Tuḥfat al-ġarā'ib. Furthermore we mention another anonymous cosmography: the Tuḥfat al-ʿajā'ib wa ṭurfat al-ġarā'ib,[90] the so-called 'Pseudo Ibn al-Athir' a work that is dated by Kowalska as younger than Qazwīnī's (± 1290) [91]

As our treatise deals with Qazwīnī's embryology we will confine ourselves to finding out whether it can be found in the other cosmographies as well. In Abū Ḥāmid we find nothing. He was a mere traveller and not a man of such broad knowledge as Qazwīnī. The tuḥfat al-ġarā'ib contains information on things of a super-natural character [92] and thus does not deal at all with embryology or anatomy. It is as we have said

impossible to consult Aḥmad Ṭūsī. al-Dimasqi contains nothing either. Much more interesting however is the embryological information found in the Tuḥfat al-ʿajā'ib wa-ṭurfat al-ġarā'ib. In the chapter of embryology it will be dealt with and after a slight comparison we will certainly be able to add more information to the status of this Tuḥfa and its relation to Qazwīnī's Cosmography. Some research on it has already been done by Kowalska in her 'Remarks' (see above). For more information on the function of arabic cosmographical literature we refer to another article of Kowalska (see bibliography of this chapter no. 14).

WORKS CITED 1

1. Abu Ḥamid al-Mazīnī 'Le tuḥfat al-albāb de Abū Hāmid al-andalusī al-ġarnāṭī' édité d'après les manuscrits 2167, 2168, 2170 de la bibliothèque nationale et le manuscrit d'Alger, Gabriel Ferrand, ed. in: Journal Asiatique (July-September 1925) 1-148, (October-December 1925) 193-304

2. Casiri, M. Bibliothecae Arabico-Hispanae Escurialensis I II (Madrid MDCCLX)

3. Cheïkho, L.(S.J.) 'De Hamah à Alep' in: al-Machriq, Revue catholique orientale sous la direction des Pères del'Université St.Joseph 20 (Beirut October 1905) 926-966

4. al-Damīrī Kitāb Ḥayāt al-ḥayawān al-kubrā I, II (Cairo 1319/1901)

5. De Chézy, A.-L. 'Extraits du livre des merveilles de la nature et des singularités des choses créés' in: Chrestomathie Arabe, III S. de Sacy, ed. (Paris 1827) 387-491,

6. al-Dimashqī Kitab nukhbat ad-dahr fī ᶜajā'ib al-barr wa-l-baḥr Mehren, A. ed. (Leipzig 1923)

7. Encyclopaedia of Islam I-IV Lewis, B. Pellat, Ch. Schacht, J. ed. (Leiden/London 1965)

8. Ethé, H. Zakarija ben Muhammed ben Mahmūd el-Kazwīnī's Kosmographie, nach der Wüstenfeldsche Textausgabe, trans. M.Ethé (Leipzig 1868)

9. von Grunebaum,G. Medieval Islam (Chicago 1947)

10. Hājjī Khalīfa Kashf az-zunūn ᶜan asāmī l-kutub wa-l-funūn, I-VII Fluegel G. ed. (London 1835-1858)

11. d'Herbelot, M. Bibliothèque orientale ou Dictionnaire universel I-VI (Paris 1781)

12. Ibn Taġribirdī Kitāb al-manhal aṣ-ṣāfī wa-l-mustawfī baᶜd al-wafī (not completely edited yet)

13. Kowalska, M. 'The sources of al-Qazwīnī's Āthār al-Bilād' in: Folia Orientalia VIII (Krakow 1966)

14. Kowalska, M. 'Bericht über die Funktion der arabischen kosmographischen Literatur des Mittelalters' in: Folia Orientalia (Krakow 1969) 175-180

15. Kowalska, M. 'Remarks on the unidentified cosmography Tuḥfat al-ġarā'ib in: Folia Orientalia IX (Kraków 1967) 11-18

16. Kračkovsky, I.Yu. Arabskaya geografičeskaya literatura arabic translation: ta'rīkh al-'adab al-juġrāfī al-ᶜarabī I,II (Caïro 1963)

17. al-Mas'ūdī Murūj adh-dhahab wa-maᶜādin al-jawhar I-IX Barbier, de Megnard, C. and L.A.J.J. Paret de Courteille, ed. (Paris 1866-77)

18. Mieli, A. La science arabe et son rôle dans l'evolution scientifique mondiale, with bibliography and analytical index of A. Mazahéri (Leiden 1966)

19. Moëller, M. Catalogus librorum tam manuscripitum quam impressorum, qui....à beato Seetzenio in Oriente emti in biblioth. Gothana asservantur I SI (Göttingen, 1826)

20. Pseudo Ibn al-Athīr Tuḥfat al-ᶜajā'ib wa-ṭurfat al-ġarā'ib al-mansūb ilā l-Mubārak bn al-athīr al-jazarī, microfilms no. 1344 ṭ and 499 (Dār al-Kutub Caïro)

21. al-Qazwīnī Kitāb ᶜaǧā'ib al-maḳlūqāt (Microfilm A 987 University of Leiden 1984. origin: Munich, Bayern State Library Catalogue Aumer no. 464 p. 192)

22. al-Qazwīnī Zakarija Ben Muhammed Ben Mahmud el-Cazwīnī's Kosmographie, die Wunder der Schöpfung, I Wüstenfeld, F. ed. (Göttingen 1849)

23. al-Qazwīnī Zakarija Ben Muhammed Ben Mahmud el-Cazwīnī's Die Denkmäler der Länder II Wüstenfeld, F. ed. (Göttingen 1849)

24. al-Qazwīnī ᶜAjā'ib al-makhlūqāt wa-ġarā'ib al-mawjūdāt Dār al-taḥrīr wa-ṭṭabᶜ wa-nnashr, ed. (Caïro no year)

25. Reinaud, M. Arab Geography (Being the translation of Section II of M.Reinaud's Introduction Générale à la Géographie des Orientaux (Géographie d'Aboulféda I)

26. Streck, M. 'al-Ḳazwīnī' in Enzyklopaedie des Islām II Houtsma, M. Th. a.o. ed.

27. Wüstenfeld, F. Vergleichungstabellen der Muhammedanischen und Christlichen Zeitrechnung (Leipzig 1854)

28. al-Ziriklī Al-'aᶜlām: qāmūs tarājim li-ashhar ar-rijāl wa-n-nisā' min al-ᶜarab wa-l-mustaᶜribīn wa-l-mustashriqīn III (no place 1954/1373)

NOTES CHAPTER 1 A and B

1) see 21 fol. 1
2) see 22 1
3) see 10 IV 188-9
4) see 5 444
5) see 5 444
6) see 4 3
7) see 25 160
8) see 7 (IV Lewicki,T. 'al-Ḳazwīnī' 865-7) 865
9) see 5 445
10) see 12
11) see 5 447
12) see 7 IV 865
13) see 5 445
14) see 19 57
15) see 22 1 and 21 fol.1
16) see 4 3
17) see 23 293
18) see 7 IV 865
19) see 7 IV 865
20) see 10 IV 186
21) see 10 I 154
22) see 2 II 5
23) see 25 159
24) see 5 448
25) for fixing the right dates Wüstenfeld's 'Vergleichungstabellen (26) were used
26) see 23 334
27) see 7 (III Ateş, A. 'Ibn al-ʿArabī' 707-11) 708
28) see 5 448
29) see 7 (I Brockelmann,C. 'al-Abharī' 88-9) 88
30) see 25 154 note 1
31) see 7 (III Rosenthal,F. 'Ibn al-Athīr' 723-25) 724
32) see 23 310
33) see 7 III 723
34) see 23 121
35) see 23 232
36) see 23 310
37) see 2 II 5
38) see 25 158
39) see 13
40) see 5 448
41) see 25 160
42) see 23 367-8
43) see 7 IV 865
44) see 21 fol.1
45) see 22 1
46) see 4 3
47) see 21 fol.2
48) see 22 p.VII
49) see 7 IV 865
50) see 26 and note 25
51) see 21 fol. 213
52) see 27 80

53) see 13
54) see 5 446
55) see 11
56) see 24
57) see 3
58) see 27 46
59) the translation of the title is taken from 7 IV 865, article on 'al-Ḳazwīnī'
60) for chapter 1.2.1. we made use of H. Ethé's translation of Qazwīnī's ʿAjā'ib al-Makhlūqāt (8)
61) this utterance of the Prophet could not be found in Wensinck's concordance of the ḥadīth.
62) until 'al-ard': Koran, sura 10:100; the rest of this verse could not be traced in the Koran.
63) Manuscript C mentions the poet: Abū l-ʿAtāhiya see 22 13
64) see 7 (I Dubler, C.E. 'ʿAdjā'ib' 203-4) 203
65) the following description of the ʿAjā'ib al-makhlūqāt is taken from 7 I 865
66) see 7 IV 867
67) see 7 I 204
68) see 7 IV 867
69) see 18 150
70) see 25 154
71) see 16 359
72) see 26 901
73) see 5 431
74) see 5 435
75) see 2 I XIV
76) see 9 301-2, 304
77) see 13 87-8
78) see 7 IV 867
79) see 14 179
80) see 17 I 268, 271
81) see 1
82) see 7 I 204
83) see 14 176
84) see 14 176
85) see 16 299
86) see 14 176
87) see 7 I 204
88) see 14 177
89) see 6
90) see 20
91) see 15 12
92) see 15 13

Chapter 2

WUSTENFELD'S EDITION OF QAZWĪNĪ'S ʿAJĀ'IB AL-MAKHLŪQĀT WA-ĠARĀ'IB AL- MAWJŪDĀT AND HISTORY OF THE DIVERSE MANUSCRIPTS

Table of contents

2.1. Textcritical remarks on Qazwīnī's ʿAjā'ib al-makhlūqāt wa-ġarā'ib al-mawjūdāt.

The textcritical aspects of Qazwīnī's ʿAjā'ib al-makhlūqāt wa-ġarā'ib al-mawjūdāt have been studied extensively by the German scholar Julius Ruska.[1] He concentrated his investigations mainly on the chapter on embryology and used it extensively in comparing the different manuscripts. Since the embryology is the subject of our paper we will concentrate ourselves on it as well, but we will not forget the important issues that should be mentioned about the rest of the ʿAjā'ib al-makhlūqāt. Ruska's hypothesis is that four variants of Qazwīnī's work may be discerned.[2] We shall see how he came to this point and afterwards give our own vision on it.

2.1.1. Wüstenfeld's edition.[3]

Wüstenfeld used for his edition seven manuscripts, which he indicated a - g.[4] A close scruting of those manuscripts brought Wüstenfeld to the conclusion that three different editions of the text were made by the author himself.[5] Wüstenfeld divided the manuscripts accordingly: a b d g belong to the first variant, c e to the second and f to the third:

codex	number	from	pages	dated	scribe
a	nr.81	Berlin	226	8th century H	-
b	nr.130	Hamburg	171	954 H	al-Maṭarī
c	nr.231	Gotha	445	1032 H	-
d	nr.97	Dresden	199	995 H	al-Ṣāliḥī
e	nr.230	Gotha	216	8th century H	-
f	nr.231	Gotha	372	1154 H	al-Takrūrī
g	nr.151	Vienna	-	-	-

	judgement Wüstenfeld:	variant according to Wüstenfeld:
a	not very good	first
b	not very good	first
c	good	second
d	not very good	first
e	not very good	second
f	good	third
g	low	first

Some additional information should be given on how Wüstenfeld came to this division: a b d g resemble generally well. The text of c and e differs in many places from a b d g whereas they closely resemble each other in omissions and additions. Both have the dedication to the Governor of Iraq ʿAlāʾal-Dīn ʿAṭā Mulk b. Muḥammad al-Juwaynī (d.681 H/1282 AD) In both the chapter on embryology is lacking. Because they are so similar Wüstenfeld alleges that c and e will have had probably the same exemplar. We will come back to this issue. f belongs to a third class since it differs very much from the first and the second variant. As basis, Wüstenfeld took f. f does not have an introduction nor a table of contents, so he took those from c. The chapter on demons (jinns)that is lacking as well in f is taken from a b and d and the chapter on animals which stands at the end,from c and e. The astronomical drawings seemed the best in b d and he also concluded those. Wüstenfeld omitted two chapters in f: the so-called seventh and eighth nazar, on men and on arts. These chapters are also found in the Persian translations of the ʿAjāʾib al-makhlūqāt and we will come back to them later. Wüstenfeld dropped these two chapters because he thought the information they contained was already mentioned in other parts of the work. f is also the youngest manuscript as is clearly visible from the scheme and the only sample of the third variant. The reason for Wüstenfeld choosing the third variant and not a compilation of the first and the second lies in the fact that he found the third one to be the most complete and also the fact that its text seems to be more similar to the text of the first variant than to the second's.[6]
In summary, Wüstenfeld constituted his text as follows:[7]

preface + introductions	p. 15 - 374	chapter on demons	animals - end
from c	from f	from a b d	from c e

He took the astronomical drawings from b and d.

2.1.2. Ruska's criticism.

Ruska came to a closer study of Wüstenfeld's edition through all kinds of problems with his text, which eventually led him to the conclusion that "Wüstenfeld's edition does not contain the real text of Qazwīnī. It is a rather young re-written text dating from the 18th century AD." [8] We will return to this statement after a close study of Ruska's investigations.

Ruska states that there are four variations of Qazwīnī's work and only the first two of them have been taken care of by Qazwīnī himself.[9] Ruska comes to this conclusion by comparing the known manuscripts and he

brings in new ones. He comes to the following division:[10]

A = Wüstenfeld's f

B = Wüstenfeld's e

C = Wüstenfeld's c

D = margin text ʿAjā'ib in al-Damīrī's Kitāb al-Ḥayawān

E = Wüstenfeld's a

F = Arabic manuscript Berlin (Ahlwardt 6162[2])

G = Arabic manuscript Berlin (Ahlwardt 6162)

P = Persian manuscript Berlin (Pertsch 346)

Q = Persian manuscript Berlin (Pertsch 345)

T = Persian manuscript

Because D, F and G belong to the same variant as a, it seemed unnecessary to Ruska to keep b d g in this scheme as d seems rather insufficiant and g is hardly used. He does not mention the reason to leave b out. Ruska follows Wüstenfeld's concept of three existing variants and thus comes to the following division:

A = third variant	F = first variant
B = second variant	G = first variant
C = second variant	P = third variant
D = first variant	Q = third variant
E = first variant	T = third variant

Then, Ruska took the chapter on embryology [11] and used it for comparing the different manuscripts. He took the -Arabic- table of contents from P, which is the most complete [12] although it is missing in P's text.[13] P divides the embryology into nine fuṣūl, parts. After comparing the part of the manuscripts dealing with embryology, he came to the following conclusion:

The first variant has only fuṣūl: I VI VII IX

The second variant has only fuṣūl: -

Of the third variant:

A has I - IX

P does not contain the chapter at all

Q contains a small part of it

T contains a small part of it

T mentions the chapters in its table of contents, but spends only twenty lines of its text on embryology and Q does not pay it more attention.[14] Remarkable is that Wüstenfeld omits the VIIIth chapter "On the cause of twins" from his edition.

Ruska's investigations lead to the following conclusions: [15]

- from a comparison of E F G D with A he deduces the existence of another, shorter variant of the work, which must have been widely dis-

persed (Variant One)

- In B as well as in C the chapter on embryology is missing: Wüstenfeld is probably right that those two manuscripts have a common exemplar (Variant Two).

However, A P Q and T, by Ruska all entitled to belong to the third variant appear to differ very much from each other. For example: A deals with anatomy much more extensively than P,Q and T. To explain this, we must investigate the differences between A and the Persian translations [16] more than roughly.

2.1.3. The seventh and eighth naẓar.

As we already mentioned, the Persian translations as well as A have two extra chapters on different peoples and arts, the so-called seventh and eighth naẓar. Wüstenfeld alleges that they give information mostly on subjects that are treated elsewhere in the text of the ʿAjāʾib; for this reason he did not include those chapters in his edition.[17] In order to make a good comparison, we will turn our attention to the Persian text of Q, since it is the most complete of them all.[18]

As to the seventh naẓar: it is found in A and Q. It is divided into nine fuṣūl dealing with the different peoples.[19] The scribe of A has additions to the text here: it contains much more than Q[20]. As to the eighth naẓar, dealing with arts: it consists of 21 fuṣūl of which A has the first twelve chapters only.* Q has all of them.[22] Ruska also drew into consideration the following points:

- The Persian translations pay minimal attention to embryology and anatomy whereas A completely restores those chapters and gives them back their old position.[23]
- In A pieces are found which are not found in the Persian translations such as the message of Abū Dulaf Mis'ar b. al-Muhalhal on the Turkish hordes of the tenth century. Furthermore, epitomes of Ibn Faḍlān on the Slavs, pieces of al-Khāzinī on precious stones.[24]
- In both, the seventh and eighth naẓar is inserted. These chapters however, are of a sometimes theological nature [25] which is strange for a cosmography and therefore they can be regarded as later additions. They certainly do not stem from Qazwīnī himself.
- However, even within the seventh and eighth naẓar we find differences between the Persian translations and A. On the rainstone, both have

*) The chapters on jinns and animals which would normally follow are missing in A as well as Wüstenfeld already indicated.[21]

the same account, but A adds to it an anecdote not hitherto known.[26]

All this brings Ruska to the following conclusion. The real Qazwīnī texts exist in two variants: Variant One and Variant Two. The Persian variant is strongly rewritten: The third variant. Variant Four is rewritten strongly[27] and of a later date than the Persian manuscripts because it contains information in the seventh and eighth nazar missing in the Persian ones.[28] Thus Ruska decides in favour of a different history of existence of both lost variants. Q P T have had an Arabic exemplar[29] already rather rewritten; A must also have had a rather rewritten exemplar, but A's exemplar is basically different than Q T P's.[30] This leads to the following survey:

VARIANT ONE:

D E F G exemplar: first text, supervised by Qazwīnī

VARIANT TWO:

B C exemplar: second text, supervised by Qazwīnī

VARIANT THREE:

Q P T Persian translations: made after strongly rewritten Arabic text

VARIANT FOUR:

A essentially changed variant.[31]

2.2. The codices Munich (M) and Sarre (S).

Several times one's attention is drawn to codex 464 of the Royal and State Library in Munich. The copyist was a physician: Muḥammad b. Muḥammad b.ᶜAlī from Damascus, dated 24 Shawwāl 678 or 778 in Wasiṭ The hundred is not visible anymore.[32] Ruska, whose attention was drawn to the manuscript by Prof. C.F. Seybold,made a very interesting remark on this codex. He compared it superficially with B C and discovered very big similarities. Thus he classified it under the second variant and even supposed that this might be the original specimen of the second variant![33] Franz Taeschner also has pointed out the M-codex as an important link in the Qazwīnī studies.[34] He also refers to another manuscript practically similar to the M-codex; a manuscript which was originally in the possesion of Professor Sarre[35] but which was transferred to the Freer Gallery of Art in Washington. This manuscript is generally dated later than M, but according to Taeschner it is more carefully written: M would have an absolute lack of right diacritic dots

as contrasted with S.[36] About the dating of both manuscripts, the following may be said: according to Taeschner, M dates from 770 H/1377 AD and S from around 800 H/ 1400 AD without motivating how he came to these results. Saxl sticks for M to 768 H/ 1366 AD and S to 823 H/ 1420 AD[37] on the authority of Professor Grazl. Wiedemann however dates M at 678 H/1280 AD, during Qazwīnī's life, judging by the illustrations: it "may be written under his eyes"[38] He says about S that it is younger than M. Wiedemann also says that Ruska and Seybold are right in their dating M at 678 H/ 1280 AD.[39]

In the end it was Ettinghausen who gives the decisive answer on the dating of both codices. In his work La Peinture Arabe[40] he discribes the developments of the Arabic-Islamic art of painting. He then writes that the miniatures of codex M 464 "reflect the aesthetical principles of the Far East."[41] They are linked with the age of the Mongols who reign over Iraq, where al-Wāsiṭ is situated. The Mongols brought their own culture and the Arab illustrators were influenced by the new style even though "the style of the Near East came first as a rule". Codex 464 is one of those rare codices in which the colours of the illustrations betray Far Eastern influences, namely the Chinese style, although it kept an Arabic Islamic basis.[42] The work fits in this period of culture -mingling, which corroborates the thesis that M is from 678 H/ 1280 AD. Wiedemann also draws the arguments from this dating among other things on the grounds of the illustrations.[43] Ettinghausen describes the illustrations of S as well. He calls it the latest important manuscript with miniatures and dates it 772-782 H/ 1370-1380 AD. It should be without any doubt from Iraq. The style of the miniatures is that of the end of the Mongol Age: the Mongol power fades away and the Persian Djalaïrids came into power in Iraq and Iran. But the miniatures still have the Arabic expression. The iconography of S puts S close to M according to Ettinghausen. Thus he concludes an earlier date of S: 772 - 782 H/ 1370 - 1380 AD.[44] This leads us to the following conclusions: most scholars date M 678 H/ 1280 AD and S to about 803 H/ 1400 AD. Since their reasons for doing so seem plausible, we will follow them in this respect. Further, we share Ruska's thesis that M belongs to the second variant and we will use M as a basis for our research on the ʿAjā'ib al-makhlūqāt of Qazwīnī and the embryology in it.*)

*) A very important note should be made. All researchers seem to ignore the very interesting remark Reinaud makes in his 'Introduction' on page 160.[45] There he mentions a manuscript of the ʿAjā'ib with the

2.3. The comparison of the manuscripts.

2.3.1. The C, A and M manuscripts.

In our research on Qazwīnī's cosmography we will confine ourselves to the C, A and M manuscripts. We might of course confine ourselves to the M manuscript only, because sufficient proof is given of its age and status. However, after comparing the Wüstenfeld-edition and M, we might come to some very interesting discoveries and that is why we will say something more about M, C and A. We take C and A, because Wüstenfeld took C for the introduction and A for the bulk of the text in which we find the part that is of special interest to us: the embryology.

following introduction of the author:"The book of Marvels of Creation.. .... one of the works of our Master, dispenser of favours, the shaykh of his times, the pillar of the world and the religion, Zakariyyā, b. Muḥammad b. Maḥmūd al-Qazwīnī, Qāḍī of Wāsiṭ in Iraq and of its independencies." In the end it reads: "Written .... by Muḥammad b. Muḥammad b. ʿAlī al-Dimashqī, physician, at present resident ... of Iraq ... the year 678 H (1279 AD)" It is a great pity that Reinaud does not give us more details on it or where he found it. Nevertheless, this information is nearly the same as M's. Reinaud even does not mention problems with the hundred. And after comparing the introductions of the author in M (See chapter 1.3.2.) and this one, we may easily say that they are very close to each other, but not from one and the same original, as R (= Reinaud's text) mentions Qazwīnī's function as Qāḍī, which is also mentioned by Ibn Taġribirdī (See chapter 1.1.4) but not in M. It is a great pity that we do not have more information from Mr. Reinaud, but if his information is true, they support the vision that M is surely from 678 H/ 1280 AD. Wüstenfeld mentions a [46] Parisian codex used by de Chézy in his remarks on his edition of the ʿAjā'ib.[47] Wüstenfeld divides it under the second variant and Ruska mentions it as belonging to the second variant as well. [48] Perhaps it is the same as Reinaud's, but evidence is missing. Another researcher might find interesting material in the libraries of Paris!

C

Manuscript C is dated around 1032 H/ 1622 AD.[49] Wüstenfeld used it for the introduction, about which we will speak later thoroughly. Important is that the manuscript contains the following dedication, as has already been observed (see chapter 2.1.1.,page23):
wa-qad kathurat ʿalā ʿawāṭif al-mawlā aṣ-ṣāhib aṣ-ṣadr al-kabīr al-ʿālim al-ʿādil al-mu'ayyad al-muẓaffar al-manṣūr ʿalā ad-dīn ʿimād al-islām niẓām al-mulk ġiyāth al-'umma shams ad-dawla ẓahīr al-milla ʿaṭā mulk bn muḥammad bn muḥammad dāʿifa llāh jalālahu wa-'adāma fī l-ʿizz wa-lʿalā' iqbāluhu etc.[50]
Wüstenfeld omitted this piece, but it ought to have been on page 4, after line 22. It is a dedication to ʿAlā al-Dīn ʿAṭā Mulk b.Muḥammad al-Juwaynī, who died in 681 H/ 1282 AD,at that time governor of Iraq.[51]

A

The manuscript A is dated 7 rabīʿ al-awwal 1154 H/ 11th of May 1741 AD as we read on the last page of this manuscript: (translation only) "The author of the book Ahmad al-Takrūrī *) says: its writing was finished at seven rabīʿ al-awwal 1154 (11th of May 1741)" and he was to call it: tuḥfat al-kā'ināt: "Present for the existing beings". This title, according to Wüstenfeld, used to stand on the title page, but it was erased and the following words were written:
Kitāb mir'āt al-kā'ināt sharḥ ʿajā'ib al-makhlūqāt[53] "Book of the mirror of beings, an explanation of the marvels of creations" It has no introduction, nor table of contents. The chapters on demons and the natural history of animals are lacking but Wüstenfeld claims that that is due to the bad condition of the manuscript. These parts must originally have been included, because for example to the introduction is referred to.[54] It also contains the famous 7th and part of the 8th aspect on people and arts.[55]

M

The manuscript M is dated 678 H/ 1280 AD. The M manuscript is written in a very clear handwriting. Diacritical points are not as scarce as

*) The letters "kru" are a correction and the original reading may have been different.[52]

Taeschner wants us to believe.[56] It is beautifully illustrated and all is written by the same hand, except for two occasions, where another hand is found. In six pages (fol. 166b - 169a) of the second kind, the jinns, of the sixth aspect, the animals and two pages (fol. 189b - 190a) of the fifth aspect, on birds. In those places, the original text has been erased and been replaced by words written in another hand. As has already been mentioned, the writer of the book is the physician, al-mutaṭayyib Muḥammad b. Muḥammad b. ᶜAlī al-Dimashqī who finished it on 24 shawwāl..78 in Wāsiṭ. The number of the hundred has become unreadable, but after elaborate investigations it was put on 6: 678 H/ 1280 AD. He lived at that time in Wāsiṭ.[57]

2.3.2. Comparison between C, A and M.

Having laid such emphasis on the manuscripts which Wüstenfeld has used most for his edition (C and A) and the appearance of the M-codex it seems sensible to compare C, A and M. Ruska already compared B C slightly[58] with M, but since I had no access to B C (only C's introduction) I will restrict myself to a comparison of Wüstenfeld's edition and M. This will eventually lead to surprising conclusions.

The preface ad-dībāja (Wü p.3 -p.5.12/ M fol.2a.1-3a.3)

The preface of both manuscripts are to a large extent similar. They differ in one minor and one major point. The minor point is that M takes more trouble to arousing man's curiosity in the marvels of creation than Wüstenfeld. Further, M seems to induce a critical attitude more than Wüstenfeld does. (M fol.2a.18- 2b.1/Wü p.1.20 only) The major point is the difference in the introduction of the author (Wü p.1.15-19/ M fol.2a.12-19). Wüstenfeld introduces him as follows:

... yaqūl ... al-ᶜabd aṣ-ṣagīr zakariyā'bn muḥammad bn maḥmūd al-kamūnī al-qazwīnī ... one blessing on him ... wa-huwa-min awlād baᶜd al-fuqahā' alladhīna kānū mutawaṭṭinīn bi-madīnat qazwīn wa-yantahī nasabuhu ilā ānas bn mālik, khādim rasūl allāhi **) lamma ḥakima allāh ᶜalayya bi-buᶜd ad-dār wa-l-waṭan wa-mufāraqat al-ahl wa-ssukn aqbaltu ᶜalā muṭālaᶜat al-kutubᶜalā ra'y ... wa-kuntu masġūfan bi-nnaẓar fī ᶜajā'ib

*) It should be remembered that if we speak about C we mean its preface and introductions (upto Wüstenfeld p.15.25). If we speak about A we mean the rest of the text upto page 368.

**) Wüstenfeld omits this sentence and puts it under it with the mention that it can be found in c and d (Wüstenfeld's c and d).

ṣunᶜ allāhi taᶜālā fī maṣnūᶜātihi wa-ġarā'ib ıbdāᶜihi fī mubdaᶜātihi kamā ...

Whereas M introduces him in a different way:

fa-inna mawlānā, mawlā an-niᶜam, aṣ-ṣadr al-muᶜaẓẓam, al-kāmil, alᶜallām muftī l-firaq ra'īs al-aṣhāb ᶜimād ad-dunyā wa-ddīn zakariyā' bn muḥammad bn maḥmūd al-kamūnī al-qazwīnī...four blessings on him ... yaqūl annahu min awlād baᶜḍ al-fuqahā al-mutawaṭṭinīn bi-qazwīn wa-yantahī nisbatuhu 'ilā ānas bn mālik, khādim rasūl allāhi ... lamma balītu bi- buᶜd ad-dār wa-l-waṭan wa-mufāraqat al-ahl wa-ssukn aqbaltu ᶜalā mutālaᶜat al-kutub ᶜalā ra'y ... wa-kuntu masgūfan bīᶜajā'ib ṣunᶜ allāhi taᶜālā fī-maṣnūᶜātihi wa-ġarā'ib ib *)dāᶜihi fī-mubdaᶜātihi kamā ...

Let us consider the main differences:

Wüstenfeld introduces Qazwīnī as a humble servant whereas M gives eight honorific titles before his name! Furthermore, M gives Qazwīnī an extra nisba al-kamūnī and M continues to honour Qazwīnī by begging four blessings on him, whereas Wüstenfeld restricts himself to only one. A major difference is also that Wüstenfeld **gives a reason for Qazwīnī's** exile: God imposed exile on him whereas M just mentions that Qazwīnī was bored of his undoubtedly not-voluntary exile. Then, both indicate Qazwīnī's decision to fill his time by writing books on the marvels of creation.

The first introduction (Wü p.5.13-8.13 / M fol. 3a.14 - 5b.21)
fī-sharḥ al-ᶜajab / on the explanation of the marvel

Except for one long passage, both first introductions are practically the same. Between bi-kuthrat al-mushāhada and wa-ᶜajā'ib of Wüstenfeld (p.8.12) M has a part dealing with anatomy and embryology. (M fol.4b.2 - 5b.20) (The translation of this part can be found in chapter 3.2) In both first introductions the reader is referred to the different subjects in the marvels of creation. M then uses nearly half of this introduction for anatomical and embryological subjects. In Wüstenfeld's first introduction they cannot be found.

The second introduction (Wü p.8.15 - 9.25 / M fol.5b.22 - 6b.1)
fī taqsīm al-makhlūqāt / on the classification of creatures.

The second introduction is in both texts almost exactly the same.

*) unreadable in the manuscript, but probably right.

The third introduction (Wü p.9.26 - 12.16 / M fol.5b.2 - 7b.20)
fī maᶜnā al-ġarīb / on the meaning of peculiarity

Both third introductions are almost exactly the same, but there are some minor differences, for instance: on al-ġarīb:
M fol.6b.2: al-ġarīb kullu 'amr qalīl al-wuqūᶜ....
Wü p-9.26: al-ġarīb kullu 'amr ġajīb qalīl al-wuqūᶜ....
It seems rather odd that Wüstenfeld's text mentions ᶜajīb as well, for it already was explained in the first introduction and it has a basical other meaning than ġarīb (see chapter 1.2.1. on the meaning of ᶜajab and ġarīb
Continuing the discourse on wise men and their ties with the ġarā'ib: Wüstenfeld only mentions: zaᶜimū al ḥukamā', M devotes a rather long part (M fol.7b.1-14) on the things what these wise men among whom the Prophet himself and al-Ghazālī had experienced in the area of the ġarā'ib. M continues then with 'zaᶜimū...." Thus Wüstenfeld mentions only "wise men", while M gives their names and exact words as well. Both however, give the views of the ḥukamā on the meaning of al-ġarīb, the miraculous aspect.

The fourth introduction (Wü p.12.16 - 13.8 / M fol.7b.21 - 8a.12)
fī taqsim al-mawjūdāt/ on the classification of existing things

The fourth introduction of both manuscripts is almost exactly the same.

fihrist / The table of contents (Wü p.13.10 - 15.25/M fol.8a.13-9a.25)

- al-maqāla al-ūlā / the first treatise
  fī l-ᶜalawiyyāt / On the celestial things.

  Both texts represent nearly the same contents. Only the ways of numbering differ.
- al-maqāla ath-thāniyya / the second treatise
  fī s-sufliyyāt / On the lower things

  Again, both texts differ in numbering their chapters and M (fol.8b.9) mentions the eight seas whereas Wüstenfeld omits them. The remaining part is the same.
- thumma (yu)tusaddā an-naẓar fī l-kā'ināt
  Then let attention be turned towards the created things

  The texts do not differ much and we will confine ourselves to the

parts concerning men: The third aspect of the kā'ināt is formed by the animals, al-ḥayawān. The texts give the next table of contents:

Wü and M -an-naẓar ath thālith: fī l-ḥayawān wa-hiya anwāʿ:
an-nawʿ al-awwal: al-insān wa-nnaẓar fīhi fī umūr:

M	W
fī ḥaqīqat al-insān	fī ḥaqīqat al-insān
fī akhlāqihi	fī n-nafs an-nāṭiqa
fī tawalludihi	fī tawalludihi
fī n-nuṭfa	-

After this, Wüstenfeld and M have a complete similar table of contents of the chapter on anatomy. And also the rest of the tables of contents on the created things is similar.
We may already point to the difference between Wüstenfeld and M in the title of the chapter fī akhlāqihi and fī n-nafs an-nāṭiqa, but in the text of M itself, the chapter is also called fī n-nafs an-nāṭiqa and does not differ very much from Wü. Another difference is that M mentions a seperate chapter on an-nuṭfa and although Wüstenfeld does not mention it in the table of contents, the chapter can be found in the text, it is included in the tawallud.*)

Comparison of the texts themselves.
We will confine ourselves to the 'look' (naẓar) at the existing things.
- an-naẓar fī l-kā'ināt (Wü p.202.6 ff/M fol.99b ff.)
  the first kind is men:
- an-nawʿ al-awwal (Wü p.302.26 ff./M fol.144a.11 ff.)
  of which the second aspect is on the rational soul:
- an-naẓar ath-thānī: fī nnafs an-nāṭiqa (Wü p.303.17 ff/M fol.144b.3ff)
  and the third aspect on the procreation of men:
- an-naẓar ath-thālith fī tawallud al-insān
  And here we are confronted with a remarkable divergency between both texts: the third aspect is missing in M, and its text goes from the end of the second aspect directly to the fourth:

*) The tables of contents can be very confusing as one table of contents puts all the chapters on an equal line, whereas the other gives one chaptertitle with several subdivisions.

- an-naẓar ar-rābiᶜ : fī tashrīḥ 'aᶜḍā' al-insān
  the fourth aspect: on the anatomy of men
  which is found in both Wü and M and which are nearly completely the same. As the procreative organs are divided among anatomy, we find their chapter in both Wü and M. After comparing them, we find only two differences:
  M has in fol.163b.20: al-qaḍīb whereas Wü has al-ᶜaṣab (p.353.16)
  M has in fol.164a.4 : al-wārid whereas Wü has wa- l-kibd(p.353.21)
  Now, if we take a look at the context, we will find Wüstenfeld's reading much more appropriate and M's even wrong. More about this in the conclusion section. Further,at the end of the anatomy we find in Wüstenfeld a:
- khātima: fī tashbīh badan al-insān al-madīna
  an epilogue in which the human body is compared to a town, which is not found in M.

If we compare the remaining part of both texts, we find that:

- in the first treatise,for example in the chapter on astronomy Wüstenfeld is more elaborate than M. More information is added to the knowledge already provided.
- in the second treatise more mountains,for example,are mentioned. And the redaction on the chapter on rivers has been altered, although the contents have stayed approximately the same.
- in the chapter on the aṣḥāb al-ᶜirāfa, the last part of the chapter of an-nafs an-nāṭiqa, Wüstenfeld has a part which is not found in M.
- in the second treatise, Wüstenfeld contains more poetry fragments than M does.
- the texts after the anatomy do not differ very much from each other, not even in the part where M is written in a different hand. (see this chapter p. 30)

2.4. Conclusions

In this chapter, we will determine the final status of M and of Wüstenfeld's edition. We will make use of Ruska's investigations and of our own comparisons as described in chapter 2.3. Furthermore, we will criticise Ruska's conclusions on grounds of contradicting evidence.

2.4.1. Status of A

It is striking to see that Ruska in his judgement over the third and fourth variant considers these variants as unities. He condemns them as a whole as being not from the hand of Qazwīnī on the grounds

of the seventh and eighth nazar as not coming from Qazwīnī.[59] Later on he qualifies the whole edition of Wüstenfeld as a mistake![60] This conclusion is too rash. Our comparison of M and A shows that they do not differ all that much from each other and that for example both's anatomy are for ninetynine percent the same. The scribe of A added parts to the text, but for the rest, he seems to have followed the text of the second and first variant rather closely, because no one can rewrite the chapter on anatomy of A so, that it becomes almost exactly the same as M's. Ruska ought to have taken the whole text into account instead of confining himself to parts of the texts, for example the story of the rainstone; and he was certainly wrong in considering the texts with their seventh and eighth nazar as being a unity. In fact, Wüstenfeld was quite right in letting them out. They do not fit in the ʿAjā'ib. They were undoubtedly added later and do not originate from Qazwīnī at all.

Ruska also gives A a rather independent status -independent of its predecessor(s)- by giving the scribe, Ahmed al-Takrūrī a rather high status. He alleged that al-Takrūrī restored the chapters on anatomy and embryology and that he generally enriched the text, so that it is basically different from the original(s). On anatomy, we must say that Ruska was completely right regarding the reconstruction of it. This chapter is almost completely similar in A and M, but not basically altered. On the embryology we are confronted with the problem that it is missing in M. Its first introduction however, pays extensive attention to it. (see for its translation: chapter 3.2). And the level of embryological knowledge in it does not seem to be below that of A's. But if we pose the question of Qazwīnī's authorship of the embryology, we must look whether we can find sparks of all nine chapters in M's first introduction. We discover that it contains information on it only to be found in the chapters I,II, IV, V and IX of the embryology (see for the nine chapters above). So how did A obtain its III, VI, VII and VIIIth chapter of the embryology? In the other first variants (a b d g of Wüstenfeld's edition) we see that they contain chapter I, VI, VII and IX so al-Takrūrī may have taken VI and VII from the other first variants. But if VI and VII were existent in these first variants, why can't they be found in M's introduction and where do chapter III and VIII stem from? Were they found in the original Variant One, but left out in the first introduction of M? This is possible since on the anatomy, M's introduction is complete: it mentions everything concer-

ning the anatomy that is found in the text of M and in A. But how come that a b d g do have chapter VI and VII, while they are missing in M's introduction? Are there more versions of the first variant? And: how reliable is M's first introductions on embryology? After all, it left out the complete chapter!
It seems that only the chapters III and VIII are completely 'new' or not traceable in A. It does, however, not seem very likely, that al-Takrūrī wrote them himself. Probably the developments of the embryology's history will be analogous to the chapter of anatomy, which he restored: he restored the embryology as well, but where he got the chapters III and VIII from will remain an open question. Thus, we will asssume that they were not written by al-Takrūrī. Thus, we can say that surely chapters I, II, IV, V and IX are from Qazwīnī, VI and VII very likely from him and III and VIII possibly. We will not say that III and VIII are an enrichment of al-Takrūrī himself and thus support Ruska's view. He restored only. In the chapter on embryology (4), we will look at the contents of the text itself. Thus, al-Takrūrī must have used at least copies of the first variant for revising the Ajā'ib, the first variant(s) for the embryology and the second for anatomy. He must also have used a third variant, since he revised and 'enriched' the seventh naẓar. Al-Takrūrī does not seem entitled to the high status that Ruska gives him.[61] He is just another revisor, who had the nerve to leave Qazwīnī's name and title out and give it his own name and new title: tuḥfat al-kā'ināt. Al-Takrūrī restored the anatomy and embryology, 'enriched' the seventh naẓar and enlarged the chapters on astronomy and mountains but he did not enrich the anatomy and embryology. The text is not basically different from its original. A is much closer to the original than Ruska thought.

2.4.2. Status of M and C

The thesis of Wüstenfeld and Ruska with respect to the first and second variant as coming from Qazwīnī himself is acceptable. The third variant is not so important to us, since it does not contain much on our subject, the embryology. As has been shown above, we put A, the only 'fourth' variant, much closer to Qazwīnī than Ruska does, especially with respect to the anatomy and embryology.
Now about the embryology itself: it is announced in the table of contents of C, but not found in C itself. It is announced in M, but not found in M itself. We find it in A with all its nine chapters. How did it develop into this situation? We assume the following (re)construction,

in which we omit the question of the number of chapters of the embryology (see above). It suffices that the embryology is mentioned in the texts:

- the embryology must have been in the first variants because that is the only source from which the scribe of A can have taken it: the second variants omit it. It must also have been in the original of Variant One, because the very probable original of Variant Two, M omits it: it goes straight from the second nazar to the fourth. How can M omit it, if it was not there? And furthermore, M mentions the embryology in its first introduction: A minor point are the errors in the text of M on the procreative organs. They are incomprehensible in view of the fact that the scribe of M was a physician mutatayyib. Wüstenfeld probably corrected those errors if they were in A as well. Were those errors made in the scribe's copying the text of the first variant?
- the suggestion that M belongs to the second variant or even is the original version of it is true.[62] B C and M both do not contain the embryology: Ruska compared them slightly and came to the same conclusion. We were not able to consult C, but we will also follow the assertion that M is the original variant because of its dating. The fact that the dedication to al-Juwaynī is missing in M is odd, but if we compare the titles of honour of Qazwīnī in M and those of al-Juwaynī in C[63] and their blessings, we find a striking resemblance. Remarkable as well is the lofty position of Qazwīnī in M and the humble one in C. In A, Qazwīnī is described as bored of his exile by God. Did the rewriter of C want to put things in its right order: praise to the authorities, al-Juwaynī, using the titles of honour first dedicated to Qazwīnī in M,and Qazwīnī in his right position: the sentence of God upon him. Anyhow, the similarity between the titles of honour may be an indication as well to the link between C and M.

Finishing those considerations, we come to the following conclusions:

- The Munich codex 464 has a high status in our investigations. It is the most important manuscript in the Qazwīnī-studies.
- Furthermore, we will extensively use A, which is much closer to M and the first variant as far as the embryology and the anatomy are concerned than Ruska wants us to believe.

The next chapter presents the translation of A's embryology; the parts on embryology in M's first introduction and its chapter on the procreative organs.

WORKS CITED 2

1. Aumer, J. — Catalogus codicum manuscriptorium bibliotheca, regiae monacensis, I 2 Aumer,J. codices arabicos complectens (München 1866)

2. Bodenheimer,F.S. — Materialien zur Geschichte der Enthromologie bis Linné (Berlin 1928)

3. De Chézy, A.-L. — 'Extraits du livre des merveilles de la nature et des singularités des choses créés' in: Chrestomathie Arabe, III S. de Sazy, ed. (Paris 1827) 387 - 491

4. Ettinghausen, R. — 'La Peinture Arabe' in: Les trésors de l'Asie Skira ed. (Genève 1962)

5. al-Qazwīnī — Codex Monacensis 464 Kitāb ʿajā'ib al-makhlūqāt wa-ġarā'ib al-mawjūdāt (14 quatr 212 fol. 27 lin.) (microfilm University of Leiden no. A 987)

6. Reinaud, M. — Arab Geography (being the translation of Section II of M. Reinaud's Introduction Générale á la Géographie des Orientaux (Géographie d'Aboulféda I)) Ali, S.M. ed. (Institute of Islamic Studies, Muslim University Aligarh 1960)

7. Ruska, J. — 'Kazwīnīstudien' in: Der Islam. Zeitschrift für Geschichte und Kultur des islamischen Orients, IV C.G. Becker, ed. (Strassburg 1913) 14-66, 236 - 262.

8. Ruska, J. — 'Ueber den falschen und den echten Qazwīnī' in: Mitteilungen zur Geschichte der Naturwissenschaften XIII (1914) 183 - 8

9. Saxl, F. — 'Beitrage zu einer Geschichte der Planetendarstellungen im Orient und im Okzident' in: Der Islam. Zeitschrift für Geschichte und Kultur des islamischen Orients, III C.E. Becker, ed. (Strassburg 1913) 151 - 177

10. Taeschner, F. — Die Psychologie Qazwīnis (diss. university of Kiel) (Tübingen 1912)

11. Wüstenfeld, F. — Zakariya Ben Muhammed Ben Mahmud el-Cazwīnī's Kosmographie, die Wunder der Schöofung, I Wüstenfeld, F. ed. (Göttingen 1849)

NOTES II

1) see 7 and 8
2) see 8 187
3) see 11
4) see 11 III - XII
5) see 11 VII
6) see 11 VIII- IX
7) see 11 XII
8) see 8 183 - 4
9) see 8 187
10)see 7 16 - 7
11)see 7 35 - 65
12)see 7 36
13)see 7 38
14)see 7 38 - 9
15)see 7 65
16)see 7 65 - 6
17)see 11 XI - XII
18)see 7 260
19)see 7 237
20)see 7 237
21)see 7 261
22)see 7 244
23)see 7 66
24)see 8 185
25)see 7 23
26)see 8 187
27)see 8 187
28)see 8 185
29)see 7 260
30)see 7 261
31)see 7 261
32)see 1 192 and 5 fol. 212
33)see 8 188
34)see 10 5
35)see 10 5
36)see 10 5 - 6
37)see 9 151 - 2
38)see 2 305 note 34

39) see 7 260
40) see 4
41) see 4 139
42) see 4 140
43) see 2 164
44) see 4 179 - 180
45) see 6 160 note 2 and 3
46) see 11 VII
47) see 3 433
48) see 7 16
49) see 11 VI
50) see 11 VII
51) see 11 VIII
52) see 11 V
53) see 11 VI
54) see 11 IX
55) see 11 IX - X
56) see 10 5 - 6
57) see 5 fol. 212
58) see 8 188
59) see 7 259
60) see 8 184, 187 - 8
61) see 7 261
62) see 8 188
63) see 11 VII

Chapter 3

TRANSLATION QAZWĪNĪ'S EMBRYOLOGY

Table of contents

3.1. Introduction

Chapter 3 contains the translation of Qazwīnī's embryology. It consists of the following parts:

- Chapter 3.2. contains the parts on embryology in M's first introduction. These parts **are not** found in Wüstenfeld's first introduction. (see on this issue chapter 2.3.2. p.33)
- Chapter 3.3. contains the translation of the third aspect, the actual chapter on the generation of man. As it is missing in M we took it from Wüstenfeld's edition, which makes use of manuscript A for the embryology.(see chapter 2.1. and 2.3.2. p. 33) Julius Ruska published parts of the text (the chapters I, VI, VII, VIII and IX) and **a translation of all nine chapters in German.**(See: Ruska, J. 'Kazwīnīstudien' in: Der Islam, IV (Strassburg 1913) 14 - 67) In his article he made some important changes to the text. We **took over most of them.**
- Chapter 3.4. contains the translation of the so-called 'eleventh kind' of compound organs, the procreative organs.(On the notion 'compound organs' see chapter 4.2.7.) We took the text from M.

3.2. Embryological parts in M's first introduction. (fol. 4b.2-8 and fol. 5b.6-21)

fol. 4b.2 Then, let him look at himself as he himself is full of miracles which cannot fill lifetimes not even by standing still at a tenth of a tenth of them! And to this pointed He, Who is praised where he said: " In your souls, do you not see? " Look how He brought together male and female and how he joined the chain of desire in intercourse and how the sperm (nutfa) comes out through the movement of copulation and how the menstrual blood is drawn from the depths of the veins and how he brought them together in the wombs and how he has created the newly born (mawlūd) from two sperms (nutfatān) and how it is fed through the menstrual blood so that it grows and gets bigger and how He divided the parts of the sperm (nutfa) which are uniform parts - into bones, nerves, arteries, veins, tendons and flesh and how he composed from them the outer limbs: he rounded the head, split the **ears and the eyes, the nose, the** mouth and the rest of the openings. He stretched arms and legs, split their ends into fingers and the fingers into

fingertops.

fol. 5b.6 And the testicles and the procreative organs are for the fullfillment of desire and the survival of the species. This is all in the sperm (nutfa) when it is in the cavity of the womb. Lines and forms show themselves in it little by little although no moulder nor machine is to be seen. Praised be He, how great is He. He proved his own existence clearly. And then: observe the perfection of his power and his complete benevolence, for when the womb gets too narrow for the baby (mawlūd) when its creation is complete, he guides its way so that it turns over and moves and asks to be let out just as every sensible person would ask to be released from confinement so that he may get out of that narrow space. Then he guides it to the breast so that when it gets out it swallows it up. And because it is weak and can digest light nourishment only he designed the creation of milk for it. He prepared it before its arrival like a host prepares the food before the arrival of the guest so that the milk can be obtained at the arrival of the newly born: its circumstances do not permit any delay. Subsequently, look at his benevolence and his mercy: how He delayed the development of teeth until precisely two years because during the first two years it is not fed but with milk so that it does not need teeth. And when it has grown it needs solid food and solid food needs to be chewn and then its teeth grow because of its need to deal with it and not later. So hard bones rise from the soft gums, well ordered like ordered pearls to chew and for the beauty. Then, look at the qualities of man, his senses and character and his different circumstances: how he becomes an adolescent, a young man, a middle aged and an old man. Let him be dazzled because of the marvels of his wisdom and let him be amazed about his power and greatness and which is mentioned here: the miracles of the body of men, less then a tenth of a tenth of it! And if these were the miracles of one creature with little volume and a weak body then look at the earth which is your hiding place, to its seas, rivers, mountains, trees, mines, plants and animals and then look up from them to the marvels between heaven and earth *)

*) from here Wüstenfeld's text and M are similar.

and then to the marvels of the heavens as the Exalted has said: " Look what is in the heavens and the earth. Let he look also at the seas. He does not know its shores, he does not know its ends nor its beginnings; and God leads to the things that are right."

3.3. The third aspect: on the generation of man

I The third aspect: on the generation of man:

page and line Wüstenfeld:

322.17 When nourishment has reached the stomach, the first force to influence it is the mechanism of digestion which purifies it by way of natural heat. Subsequently, it transports the purified nourishment to the liver and cooks it well in the liver once again. Then it distributes the nourishment among the blood-vessels and organs which are ready to receive it so that every organ gets its share. This results in growth, that is: expansion in all dimensions: length, breadth and depth.*) And from this food he takes a part and as it is impossible for one person to live forever, divine wisdom has decided to plant in every living (being) a power with which it draws forth the non-existant into existence to preserve that species and that is the power of intercourse and for that purpose he created a substance (mādda): the remainder of the food that is begotten from **) the last digestion (and that) is sent to the spinal cord and from the spinal cord to the two testicles. In them it changes into the nature of the sperm (many) which tickles and causes the restlessness of a camel: it will not quiet down except when it looses that matter ***) And it is a moist, sticky, hot

*) Here Wüstenfeld has left out a part of A and inserted instead the line: وما فضل من الغذاء فى " and the food that is left over from .." (Wü p. 322.21), which he took from texts of the first variant. Ruska gave us back the text of A in this place, which translation we give here.

**) Here the part Wüstenfeld left out ends.

***) Here too Wüstenfeld has left out a substantial part. (Its text can be found in Ruska's article p. 41 and 48-9) and he replaced it by texts of the first variant of which the translation is as follows:

And that is the reason for the union of the male and female. And when the sperm (nuṭfa) has attained the womb, the sperm (nuṭfa) of the

substance, mingled with much pneuma (rīh) confined to tracts with a strong sensitivity and when this substance (mādda) has reached the testicles, it becomes white in them because of their shaking just as milk in the breasts. And then, when the need is there the pneuma (rīh) arises from it and fills the cavities of the penis so that it grows and the sperm (nutfa) goes through the end of the penis and reaches the procreative organs of the female and the orifice of the womb receives it by opening up and the intense pulling (force) of the sperm (many) of the female which having sprung from its testicle(s) drips in the vagina which is like an inverted penis and then the two spermatic fluids (nutfatān) mix. The sperm (nutfa) of the male resembles the sperm (nutfa) of the female just as rennet resembles milk because in rennet there is a curdling power and in milk there is power to be curdled and in each of the spermatic fluids (nutfatān) there is a heating, crushing power; and in the sperm (nutfa) of the male is an attaching power because the pneumata (riyāh) have the effect of claws of a predatory animal on its prey. Attaching itself to the womb together with the sperm (nutfa) it pierces the openings of the veins from which the menstrual blood flows to the womb and it pierces that which encloses the sperm(nutfa): the membrane which we have mentioned. Then a pneuma (rūh) is formed within this membrane which seeks to get out and this membrane is pierced just as the mouths of the veins of the womb are pierced and an opening is formed towards this membrane. The embryo (janīn) feeds itself with nourishment and what is not good stops short around the placenta to assist the getting out at the time of birth.*) Then the molding power mixes together, with God's benevolence, the grease of the sperm (nutfa),

male and the female mix in the form of a ball. Then over it a thin hull is formed by way of the heat of the womb just as can be seen with dough when it is put in something warm. The mouths of the veins attach themselves to it from which the menstrual blood flows to the womb.

*) Here the text Wüstenfeld left out ends.

and that is the mixed pneuma *) and takes a part of it to the midst as a preparation for the heart and from its right side a part for the liver and from its upper side a part for the brains. Then the hilum is created, connected by
5 means of a vein and an artery with the womb and that is the membrane that surrounds it from the beginning of (its) cre-
323 ation like a bag. This change takes place within six days. Then, after these six days lines and spots appear on it. This is completed on the ninth and tenth day. On the fif-
10 teenth day the menstrual blood penetrates the entire ball so that it becomes a blood clot. After this, in twelve days**) the moisture becomes flesh, clearly to be distinguished into parts and limbs. Then the moisture of the spinal cord expands: it is the basis of the body. Then, after nine days
15 the head seperates itself. Shoulders and limbs***) (form themselves) from the ribs and the belly within a period of forty days, with forty-five days as a maximum and thirty-five days as a minimum, because the formation process of females is slower than that of males. Then, its bones
20 appear. Subsequently they are covered with flesh that originates from the menstrual blood, just as the Exalted has said: "We created man from a strain of clay (ṭīn), then we made it into a sperm (nuṭfa) in a hidden dwelling; then we changed the embryo into a blood-clot (ʿalaqa) and from the
25 blood-clot into a piece of red flesh (muḍġa); then we made bones for this piece of red flesh and clothed the bones with flesh. We generated another creature."

Blessed be God, the greatest Creator!

323.11 II Chapter on the circumstances of the sperm (nuṭfa) in each of the nine months.

They assert that when the sperm (nuṭfa) has established

*) وهى الروح المخالطة , in A, but omitted by Wüstenfeld (correction Ruska p. 49).

**) Wüstenfeld has ياتى , which is wrong according to Ruska. It should be باثنى (taken from first variant - texts, see Ruska p. 42.50)

***) Wüstenfeld has والاطراق , which is wrong according to Ruska. It should be والاطراف , (taken from texts of the first variant, see Ruska 42.50).

itself in the womb, God, the Exalted, creates in it a power that draws the sperm (nutfa) to it. Then, the menstrual blood, that is thrust out of the body normally at the time of menstruation, draws to itself the sperm (nutfa), when it had established itself in the womb just as the flame of the lamp draws to itself the oil that is in the wick. Then the blood dries up around the sperm (nutfa) just as the white of an egg dries up around the yolk. The sperm (nutfa) coagulates when the heat has affected it in the same way that milk coagulates because of breezes. The sperm becomes a blood clot and remains like that for thirty days and 72 hours. The astrologers say that during this period it is under the influence of Saturn. Then God, the Exalted, makes heat appear in that clot. He makes its constitution well-balanced and administers to it a kind of shaking and trembling. It stays in this condition until two months have passed. The astrologers say that during this period it is under the influence of Jupiter. Then God, the Exalted makes appear in it an increase of heat so that it becomes a piece of red flesh. And that is its nature until exactly three months. The astrologers say that during this period it is under the influence of Mars. When it has entered the fourth month the assembling of the parts which together build up the body is complete. The figure is formed, its nature is completed, the form of the limbs has become distinct, the joints are put together, the nerves are branched, the veins have spread within the flesh. Around this time the angel blows the spirit (rūḥ) in it and in it flows the animal soul (an-nafs al-ḥayawāniyya) This situation continues until exactly the fourth month and the astrologers say that during this period it is under the supremacy of the Sun. When it has entered the fifth month the process of creation is finished, the structure completed and the shape of all limbs has become visible: the sockets of the eyes are there, the nostrils are split open, the mouth is opened and so are the ears as well as all other passages. And this period takes until exactly the fifth month. The astrologers say that during this period it is under the influence of Venus.
324 When it has entered the sixth month it starts to move more

frequently: it kicks with its legs; it stretches its arms; opens its mouth; moves its lips and twists its tongue around. It sleeps and wakes up. This situation continues until exactly the sixth month and the astrologers say that during this period it is under the influence of Mercury. And when it has entered the seventh month its flesh increases, its body becomes fatter, its limbs more solid, its joints stronger, its movement more powerful and it experiences the narrowness of its place and it wishes to leave it. And if God, the Exalted, has so predestined it gets out as a perfect fetus (janīn) and lives. And if God, he is Exalted has not yet predestined it then it stays there till after the seventh (month). The astrologers say that during this period it is under the influence of the Moon. And when it has entered the eighth month hardship and trouble it befalls because of its great restlessness in the seventh month when it sought a way out. We have already mentioned that, if it is able to break through the membranes, it comes out, complete and perfect. But if it cannot (break through them) a dullness befalls it because of the frequent motion and the great restlessness in the eight month: it is ill for forty days and when the trouble of birth afflicts it as well, its strength fades away completely and it lives only rarely and if it lives, it is with troublesome movements and for a short period. The astrologers say that it is in the eighth month under the influence of Saturn and thus they have closed the circle. When it has entered the ninth month its whole constitution is well-balanced and its spirit (rūḥ) has become strong in it .. The actions of its animal soul (an-nafs al-ḥayawāniyya) become manifest. The astrologers say that it is in this period under the influence of Jupiter and God leads to what is right.

324.16 III Chapter on the formation of the membranes and their advantages.

They say that the first membrane*) is formed on the attach-

*) We follow Ruska's correction (p. 55): after انه a subject should follow, probably something the like of: الغشاء الاول or اما الغشاء الاول فانه

ment surface of the fetus.*) That membrane is the placenta and when the seven days have passed another thin cover comes into being within the placenta. It is formed just like the first one, namely by the power of heat and it is called the wrapping membrane (allantois). In it the fetus's (janīn) urine and its stools assemble. Then another membrane is formed called the amnion: in this the fetus's (janīn) sweat assembles. It surrounds the fetus (janīn) as a skirt and absorbs its sweat so that the sweat remains in the amnion and the urine in the wrapping membrane until the moment of birth. The wrapping membrane is surrounded by the amnion and the placenta is surrounded by the wrapping membrane and the last one is connected with the womb. As to the advantage of those membranes: when the fetus (janīn) excretes waste matter, the necessity arises to dispose of it, and then the amnion is there to absorb the sweat. If not, urine would mix with sweat and urine would contact the skin and it would irritate it because of its sharpness and it would harm it. And if there was no wrapping membrane, the excretion would heap up in the womb and would contact the vessels from which blood flows to the fetus (janīn) and then the blood would become corrupted due to being mixed with the excretion. The advantage of the placenta is that it transports blood and pneuma (rūḥ) to the fetus (janīn). The advantage of the stay of these excretions in these receptacles is that the fetus (janīn) is carried in the midst of it so that the amnion does not get out of position through its discharge. The moisture which is in the wrapping membrane helps the fetus (janīn) to get out. It makes its coming out easier.

324.29 IV Chapter on the nourishment of the fetus (janīn) through the menstrual blood.

The menstrual blood runs from all parts of the body to the
325 womb by rotation. The reason for it is that the blood gets into commotion and boils up every month, just like the

*) Wüstenfeld has العجين Ruska deems this impossible: It should be الجنين (Ruska p. 55)

waters of the sea. When the blood comes into motion and boils up, it is directed towards the womb. When it reaches the womb and finds the mouths of the veins closed it opens them suddenly, thus exposing women to pain through this opening up. As to pregnant women, they are not exposed to this pain because the mouths of their veins are open and because the blood does not appear in them suddenly nor in large quantities owing to the sperm (many) impeding it and because of the wall of membranes and covers, (if not) pregnancy would be spoiled. Divine providence has prevented its sudden flow and has led it into the veins so that nothing flows out of them except that which the pulling power draws to the fetus (janīn)according to its need. It issues from it little by little continuously. And when it appears it comes to a standstill around the placenta and within it in a circle so that nourishment reaches the fetus (janīn) from all sides. And this happens in due proportion because the soul (nafs) is (still) weak with respect to the quantity of nourishment: it should be little. Then the soul (nafs) gets stronger. And each time when it wants its food, the amount of it increases because it gets stronger owing to its drawing the food via the openings of the veins which are connected with the placenta. The fetus (janīn) only takes menstrual blood which is good because the pulling power draws nothing which is unsuitable for the one that is to be fed, that is: what the changing power has changed: pure blood. When the fetus (janīn) moves and its shape and its limbs have been completed, the quantity of menstrual blood increases in accordance with its need and it rises in the direction of the breasts. Divine wisdom has provided for the preparation of food which is suited to it before it needs it just like a wise man prepares what he needs in the case of a banquet before the arrival of the guests. When the fetus (janīn) is born, its limbs and powers are weak, it has a moist body and it is not capable to feed itself with strengthening food, because its powers fail to digest it. While at first in the womb it was used to feed itself with menstrual blood, the Exalted Creator prepared for it a nourishment that is truly close to the food with which it was

used to feed itself before. And also because of the formation of milk out of the blood which rose to the breasts, the rise of the blood and the widening of the vessels, Divine Providence has taken care of it to have the milk prepared at the moment of birth so that the food is prepared and ready at the arrival of the guest; it does not need to be cooked, nor brought, nor to be prepared in any other way. Praised be He, how great is His power, and how immense His benevolence!

325.24 V Chapter on the actions of the different powers in the fetus's body

All powers are present in the essence of the sperm (nutfa). When they get into action at first they are very active and encompass it with flesh. Then, very actively, they form the membranes and the blood-vessels that appear in it with the appearance of the pneuma (nafkh). Then all powers are set in motion in it, I mean: the power that changes; the power that shapes, that makes the tools, that makes the tracts; that joins; that separates. All powers are in motion and each exercises its special effect on it. All these powers cooperate during the same period of time. I mean that they all start to function together and not one of them gets
326 worn out nor is the one finished later than the other. No, each one moves from one point to a single aim: the perfection of the shape. The divine powers do not act on the fetus (janīn) in the way of for example the craftsman, who starts with the foundation, goes on with the wall and then with the roof. No, all parts come into being at the same time, even though this is not always visible to us. Subsequently, they exert themselves to make the limbs separate: they separate the head from both shoulders and form it on the neck. They separate the arms from the ribs and one leg from the other. They split the fingers from each other. Then, each part is given the adequate form that it requires. And when they have finished in thirty to forty days every organ is fed with the general food which is supplied to the fetus (janīn). Then it starts to move in the third or fourth month and that is because the fetus's (janīn) limbs are soft and moist and if it had moved

before this time not all of its parts would have become solid: they would have been folded. Its bones would have become crooked and it would have rolled out of the position in which it had been laid. Divine power has protected it and kept it safe against these things for a period: the period during which it became solid and strong. For in this period its limbs are small, its weakness very susceptible to damage. That is why it needs the power to feed itself to increase in size and in strength. Thus divine wisdom has provided for nourishment by way of its mother, just as plants are fed by the soil for their completion.

326.15 VI Chapter on the position of the fetus (janīn), in the womb. Hippocrates has said that it sits with its head on the knees and both its upper arms against its ribs, its hands carry its head and its head lies in the direction of the mother's head and its legs in the direction of her legs, the limbs pressed together as symmetrically as possible. Its face is turned to the pregnant one's spinal column and its spinal column to her weaker parts. Its being in this position is according to God's providence, because the head is heavier than the rest of the parts of the body so that it needs something to support it. So it is supported by the knees even though the knees are weak and moist. But their task is alleviated as the arms help them to prop it up because moreover the arms lay against it so that when it comes out or rolls over with its head down, arms and knees come out together with the head so that the birth is made easier. It has its face turned towards the spinal cord to be more protected against bunches against the spinal cord. Its back is turned toward her weaker parts so that its back is further removed from damage. This position is very suitable for the facilitation of birth because if its head lay close to its legs and its legs in the direction of the opening of the womb and if its connection with the womb were undone then it would come to lie with its head down because its head is heavy so that it would fall down quickly. And: forms that are mostly round and curved are less susceptible to the infliction of damage. And because the heart, which is the well of life, must be protected

and because it has no other choice than this form and because the fetus (janīn) is in a confined space, divine wisdom has pressed togetner the other limbs and has made them like a ball so that it finds space in that narrow
327 5 place, just like we press ourselves together and our form becomes like a fetus (janīn) in the womb

327.2 VII Chapter on the origins of the male and female.
One of them asserts that its origins lie in an increase of heat that God, the Exalted has created in the matter (mādda)
10 men are created out of, and a lack of heat in the matter (mādda) out of which women are created: and that is why his reproductive organs protrude and hers are hidden. Further when at the basis of creation natural heat is perfect a male is the result, with complete limbs and with a strong
15 masculinity; if the heat is not perfect, neither is his masculinity, and his behaviour and nature resemble that of a woman. Regarding femininity there are gradations as well because there are women whose behaviour resembles that of men and there are those who are very feminine. And if those
20 gradations descend equally on either side one may observe in between of them a strange, abnormal condition because then the newly born is neither a boy nor a girl but a hermaphrodite. This particular situation of the layers (cavities) of the womb will be shown in the (chapter on)
25 anatomy; this will be mentioned with God's permission *)
44.1 And one of them has said that in the semen (zarᶜ) of the male is a formgiving principle and that in the semen (zarᶜ) of the female is a formgiving principle. The shaping power which is in the semen (zarᶜ) of the male pours into the
30 formation of something that is the like of the thing it (the semen) separated itself from except if something hinders it (the semen); and the shaping force that is in the semen (zarᶜ) of the female pours into the reception of a shape that is accepted by the like of it, of which it separated

*) Here (327.11) Wüstenfeld left out the following piece.(to be found in Ruska p. 44 note f and p. 61 - 2) and inserted instead the line: "ومنهم من زعم ", "and one of them has said" (taken from texts of the first variant).

itself. And if one of the semens (zarᶜān) is stronger the child will be the like of (the parent of) the strongest semen (māddat az-zarᶜ).*) And they maintain that the dominating principle in the creation of the male is its obtaining a position on the right side of the womb; and for the creation of the female its obtaining a position on the left side of the womb. And possibly a warm city, a hot season, a southern wind and an age of maturity contributes to the creation of a female whereas the opposite of these things is conducive to the formation of a male. An outstanding scholar has said that the origin of the male sex lies in the condition of the male sperm (many), its heat, sexual intercourse taking place at the moment that she (the woman) is (ritually) clean and the fact that the sperm (many)appears on the most right side which is warmer and thicker and its arrival at the right side of the womb. And possibly a cold city, a cold season, a northern wind and an age of youth are conducive to this. Some people claim that the male sperm (many), if it flows from his (the male's) right side to her (the female's) right side becomes a male and that if it runs from his left side to her left side it becomes a female and that if it streams from his right side to her left side it becomes a feminine male such as the men with a behaviour and character like a woman's which one sometimes sees. And if it flows from his left side to her right side it becomes a masculine female such as the women with a behaviour and character like a man's which one sometimes sees.

45.6 VIII**) Chapter on the cause of twins:

they say that the reason lies in the different ways in which the sperm may drop. Because when the sperm***) is ripe with a fitting blend for a male, a male is begotten and when it is not ripe, and has a fitting blend for female, a female is bred and that which falls in the right cavity of the womb will be a male and that which falls in the left cavity

*) Here the piece Wüstenfeld left out ends.

**) Wüstenfeld has left out of A the following chapter of the embryology: on twins. Ruska gave it back to us (see Ruska pp.45-6, 63-4)

***) Here we adopted Ruska's correction: زرعات instead of زرقات (Ruska p.63) The way of dropping is not relevant here.

of the womb will be a female and if both drops of sperm *)
are equal they will be two males or two females. And that
is what they have called the natural, material cause and
the metaphysical cause is God's providence"who gives girls
5 to whoever he wants and boys to whoever he wants, or gives
them pairs of boys or girls. And he makes barren whom he
wants.He is the Omniscient, the Able One" (sura 42:48-49).And
about others than people: there are animals that give birth to many
young ones like pigs and others. So God, the Exalted created
10 them with many wombs and breasts. And the reason for that is
that divine care is dedicated to the preservation of all
animal species so that the offspring of no one of the kinds
is cut off; so he made for the kind to whom death comes
quickly and whose constitution is weak and whose time is
15 short many young ones and he created for them wombs so that
embryos ('ajinna) can be formed in it. And he made the
number of their breasts equal to that of their wombs so
that there is sufficiant nourishment for the fetuses
('ajinna) that are formed. And it is passed on from al-
20 Shāfiʿī, God have mercy on him that in his lifetime a woman
47 had a miscarriage of twelve fetuses (janīn). But God knows
best how his creatures are made. Because these are issues
for the one who claims that there are as many fetuses
('ajinna) as there are cavities in the womb and that the
25 cavities of the womb are equal in number to the breasts.

327.21 IX Chapter on birth:

The divine power, when it has completed the baby (mawlūd)
so far that it can stand the air outside, pushes it outside
by setting in motion powers existing in the womb in order
30 to drive it out. Because if it would stay in the womb after
its completion it would feel the need for large quantities
of nourishment and the mother's nourishment would not
suffice any longer nor would her vessel be large enough to
carry it and the size of the baby would increase so that it
35 would become more difficult for it to come out, which would
eventually lead to its death and that of its mother's. When

*)Here we let the text unchanged (زرقتان) unlike Ruska's correction (رعتان). (Ruska p.63) Here the dropping is relevant.

the time of birth has come the retentive power brings its activity to an end, the pressing power starts moving, and the baby starts moving by itself as well, because the nourishment of its female bearer does not suffice for it any more as we have already said: that is why it is restless and is moving strongly and why it stretches. Because of the force of the movement with its arms and legs it breaks the amnion, the most delicate of the membranes that surround it. And when it tears apart the two membranes which come after this one first the wrapping membrane is
328 torn because it is weaker than the placenta and because it receives the movements of the fetus (janīn) before the placenta. And when this one is torn its connection to the womb is broken and when this connection is broken, the connection of the placenta to the mouths of the veins has become weak, and when this connection has become weak the placenta breaks and the bond with the fetus (janīn) dissolves and it falls down just like an object falls down from a high place to a lower. The cavity of the womb contracts and its neck opens itself after it is moistened by the fluids that were in the membranes before the appearance of the fetus (janīn) to make the passage smooth and thus to facilitate birth. Then birth itself: if it is natural it starts with the head because its upper parts are heavier than its lower parts: from the hilum to the head is heavier than from the hilum to the feet and thus the heavier part comes out first followed by the lighter in accordance with the power of the Benevolent and Omniscient.

3.4. The eleventh kind: the procreative organs.

352.12 The eleventh kind: the procreative organs:

they are equal in male and female although the designing power has extended the male organ because of its excess of heat and it has let the female organ be directed inward because of a lack of heat just like one can see for example in the eye of the mole, a kind of a blind yarboa. Nature has given it a complete eye, but because it failed to split open the skin which covered it, the eye stayed rudimentary and did not emerge. If it had put the male organ inside,

the scrotum which is the bag in which the testicles are, would occupy the position of the womb and the urethra would be located in the position of the vulva but the testicles of the male lie within the scrotum and those of the female next to the womb on the outside, to make space for the fetus (janīn). The procreative organs are extensive. Folded veins belong to it, surrounded by swollen flesh where what remains of the food goes, coming from the spinal cord and they prepare it to become sperm (many) and they are called the sperm (many) vessels. To them belongs what gives this matter (mādda) creative power as well, like the testicles of the male and the female. They consist of solid, swollen flesh. In the male they are situated in two wrappings resembling a bag, which is called the scrotum. In the female they lie outside the womb. The testicle of the female is smaller than the testicle of the male and much flatter. From both of these the sperm (many) of the female flows to the cavity of the womb and that of the male to the urethra. And to it belongs the penis, a body rich in nerves that originates from the pubic bone with many cavities and on the bottom of it run two arteries and many veins. From it two ducts penetrate the testicles through which the sperm (many) flows from the testicles to the urethra; the latter takes the place of the vulva of the female. And sometimes the penis must be stretced and then again resting and relaxed. As to its stretced position: that is for the moments of procreation so that it can reach into the vulva and thrust the sperm (many) into it without exposing it to the air or a strange body that would affect its power; and it is also to open the flow of sperm (many) in it so that it
353 widens itself. Then the pushing power can throw it and push it with power and speed from the vessels to the cavity of the womb. About its relaxed condition: that is at moments when procreation is not aimed at probably because the body or other parts restrain some of its activity. The designing power has created it from a hard kernel with a cavity so that when its cavity is filled with the pneuma (rīḥ) it raises itself and obtains a vertical position. And if it is empty of the pneuma (rīḥ)it returnes to its resting position. It is not made of a bone core because then it cannot obtain

a resting position. No, its core is made of a mixture of connective tissue and nerves: nerves to support the stretching, and connective tissue for the growth from the bone and the basis on it. It grows from the pubic bone in order to give it a solid and strong basis, and accordingly is better equipped to function properly, and does not bend when it raises itself and gets into a vertical position and does not incline towards other directions. It originates from the highest part of the bottom of the pelvis. It does not originate from the lowest part so that it is far away from the anus and thus not gets stained. It is not concentrated on a higher place than this just like he has made it higher than the pubic bone. For in that place there is no bone to attach itself to. Furthermore it is not created on the side of the body because a member that grows from one side needs a simular one opposite it. The single limbs are in the middle as one can conclude from the nose, the tongue, the heart, the stomach and so on. To these the womb belongs as well. It has a kernel with nerves so that it is very sensitive and has a pleasant property and so that it is capable of stretching and widening with the growth of the fetus (janīn) and to pull itself together again after it has become empty. It is situated between the bladder and the large intestine because that is the most fitting place for the genesis of the fetus (janīn), its growth and its birth. It is fittest as regards its genesis, because it lies in the centre of the membranes so that it is the hottest and moistest place. It is fittest as to its growth, because this place can stretch in proportion to the stretching out of the fetus. It is fittest regarding its birth, because of its weight and inclination downward and the support of the belly muscles to push it outside. The womb is created with two cavities: the right and the left cavity. The right cavity is made of a hotter composition and a greater strenght. This is caused by the blood and the spirit (rūh) which come to it from the heart and the liver so that it is suitable for creating a male. The left cavity is different, in order to be fitting for the formation of the female. Moreover it possesses two protuberances which extend through two narrow passages until they reach the two testicles which

lie outside the womb. These two protuberances are called the horns of the womb. The womb can pull the sperm (many) that drips out of the testicles of the woman with them. It has a neck that ends in front and it has the same function as the urethra of the male. The vulva of a virgin is closed and rumpled. These creases are interwoven with fine veins which break at the moment of penetration. When the woman gets pregnant the vulva is drawn together so that no inclination can enter. And when the moment of birth has approached or the fetus (janīn) is injured it widens so that the body of the fetus (janīn) passes through it. The womb draws the sperm (many) of the male through its neck and it draws forth the sperm (many) of the female through its horns. Further it has flexible ligaments that connect
354 it to the spinal cord and to other parts of the body that surround it. This ligament exists to keep it in position and it is flexible so that it is able to stretch when pregnancy occurs and to shrink when it is empty again. And this belongs to what is right with the masters of anatomy and God knows the nature of his creatures best. He leads to the only right way.

Chapter 4

QAZWĪNĪ'S EMBRYOLOGY

Table of contents

Introduction to chapter four.

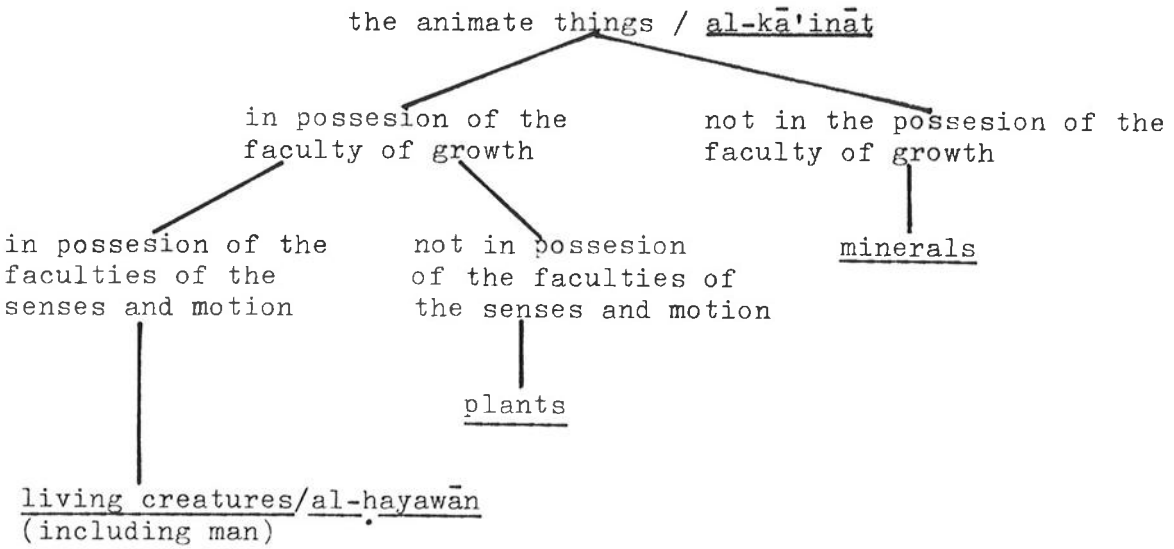
Chapter four is divided into two parts. Part A presents a thorough analysis of Qazwīnī's text on embryology. Other parts of the text of the cosmography are added to it if their contents appeared to contribute to a better understanding of the embryology. Part B presents the discussion of Part A.

Part A: ANALYSIS QAZWĪNĪ'S EMBRYOLOGY

4.1. Introduction to the animate beings.

The ʿAjā'ib al makhlūqāt wa-ġarā'ib al-mawjūdāt is divided into two parts: the first part deals with the so-called ʿalawiyyāt, the celestial things and the second part deals with all earhtly things existing on and around earth. The second part is in its turn divided into two parts. The first part is on the sufliyyāt, the non-living things on and around earth, for example mountains and rivers. The second part is on the animate beings, the kā'ināt, divided into three kinds: minerals, plants and living creatures (ḥayawān). The living creatures are divided into six categories: man, jinn, grazing live stock, predatory animals, birds and animals with strange appearances. The chapter on man is divided into eight sections of which the third, on embryology and the fourth, on anatomy are our main interest. As mentioned before (see chapter 2.3.2.) the embryology is missing in the text of M although it is announced in its table of contents. Therefore we use the text of it which has a rather good status according to our research (see chapter 2.4.2.) In this chapter we will take a look at how Qazwīnī came to the division of the kā'ināt into minerals, plants and living creatures.[1)]

In his introduction to the kā'ināt, the kā'ināt[2)] are presented as originating from 'mother-elements'. In the first place however the kā'ināt are divided according to certain faculties:



The elements the animate beings are made of are the ʿasārāt,'juices' which are formed in the following way: rainwater comes down and filters to the interior of the earth; there it mixes with earthly elements,

and this emulsion is heated by the depth of the earth: a substance comes into being fit for the formation of minerals, plants and animals. All degrees of the kā'ināt are formed by this matter: the lowest subdivision, starting with the minerals is close to the element of earth and the highest subcategory is close to the pure soul of an angel. The lowest subspecies of the minerals is closely connected with either water or earth and the highest with the plants. The lowest degree of the plants is closely connected with the minerals and the highest with the animals. The lowest degree of the animals is in turn connected with the plants and the highest with man. The lowest degree of man is connected with the animals and the highest with the angels. Angels however are not found in this division. They live superterrestrially and their description can therefore be found in the treatise on the ʿalawiyyāt.

We will indicate summarily the lowest and highest degrees of minerals, animals and plants.

minerals: the lowest, connected with earth: gypsum
the lowest, connected with water: salt
the highest: mushrooms and the like

plants: the lowest: green dungherb (khadrā' ad-dafn)
the highest: date palm

animals: the lowest: snail
the highest: ape, horse and elephant

human beings: the lowest: man with attention only for earthly pleasures
the highest: man refraining from earthly pleasures and with a clear view of the things one cannot see: the world of spirits. He is almost like an angel.

Remarkable is the highest mineral: mushrooms and the like. It certainly fits within the category of minerals if we read Qazwīnī's argumentation but in our view however they have the faculty of growth, while minerals are supposed to miss this faculty. It is also remarkable that here man is in an extra subcategory within the subcategory of animals whereas in the division according to the faculties he is on the same level as the animals. Here man has a special place in the kingdom of the hayawān

And that is in a way proved by the introduction on man in M:[3] "Man is the most sublime living being and the essence of all creatures." Where animals only have the faculties of the senses and of motion,[4] man is given much more by God.[5]" He has a spirit (rūḥ) and a body. He has the faculties of understanding (fahm) and sense (ʿaql). He has outer and inner senses (ḥawāss ẓāhira wa-bāṭina). God constructed the brains for the soul endowed with reason and put them in the highest place and adorned them with the faculties of thinking (fikr), memory (dhikr) and memorization (ḥifẓ). The brains are given power over the faculties of sense so that they reign over them, having the faculty of sense as their wazīr, the powers (quwā) as their soldiers, the sensus communis (al-ḥiss al-mushtarık) as their courier, the body as the seat of their kingdom and the limbs for servants. Man is a little cosmos. If he feeds himself and grows, they say he is a plant. If he feels and moves, they say, he is an animal and if he grasps the realities of things he is an angel. He has all possibilities within himself. If he reaches for food, he will get it. If he wants to move he can. And he can make choices: he can concentrate on the pleasures of life but he also has the possibility of focussing his attention on a higher world, the things of heaven. As God, the Exalted has said:
" wa-faṣalnahum ʿalā kathīr mimman khalaqnā tafṣilān. "We presented to him many things we have created." [6]

4.2. Embryological factors.

In our discussion of Qazwīnī's embryology we make use of the texts the translation of which is found in chapter 3. References to it will be made by mentioning the page and line concerned in it. Sometimes however there will be referred to not here translated parts of Qazwīnī's Cosmography, notably his introduction to man: an-nawʿ al-awwal: al-insān, "the first category of the living creatures" (M fol.144); short pieces of his anatomy and parts of the first introduction. References to these parts will of course be made.

Considering the embryology we can now discover many factors and processes which play a role in all aspects of it: from the origins of the sperm to the period shortly after birth. This chapter presents all these factors and processes, which seem to be in the first instance rather independant but are eventually closely connected as we will see.

4.2.1. The divine factor.

"It is God who created man and who made him the most perfect creature of all. He gave him a spirit (ruḥ) and all his faculties. Furthermore it is he who joined male and female and who influences the genesis of the embryo from beginning to end." That is what we read in the introduction to man (M fol. 144) and the first introduction (M fol. 4b and 5b). The action of his creative power manifests itself many times in Qazwīnī's embryology quoting Koran 23: 13-14 (3.46.21-29) "We created man from a strain of clay (ṭīn); then we made it into a sperm (nuṭfa) in a hidden dwelling; then we changed the embryo into a blood-clot (ʿalaqa) and from the blood-clot into a piece of red flesh (muḍġa); then we made bones for this piece of red flesh and clothed the bones with flesh. We generated another creature." Further it is God who creates a power that draws the (male) sperm (nuṭfa) when it is in the womb to the (female) sperm (nuṭfa) (3.46.31 - 47.2). It is He who divides the parts of the sperm (nuṭfa) into bones etc. (3.42.12-14) It is very interesting that once mention is made of the "designing power" which decides to create, instead of God.(3.57.35) *) It is God who makes appear a heat in the blood-clot (3.47.14) so that it becomes a piece of red flesh. Subsequently it is God who decides whether the fetus comes out or not in the seventh month. (3.8.50-13)

The cause for a fetus to become male or female depends on the degree of heat that God has created in the matter (mādda) he creates fetusses of. (3.53.7-11) It is God who determines the sex of the child or whether twins shall be conceived in accordance with his will. Further he makes barren whom he wants. (3.55.4-7) Animals with a weak constitution and who die easily, he gave many wombs and breasts for the survival of the species (3.55.7-16). God knows the nature (kayfiyya) of his creatures (3.55.21-22). Also we can detect strong divine influence with respect to the powers: all the powers that are active in the formation of the embryo (janīn) (3.51.25) are divine. The molding power acts with God's permission (3.45.30) Divine wisdom planted the force of intercourse in every living being. (3.44.17-19) It is the divine power that guards against the fetus's moving too early (3.52.4-5) and it is also the divine power which (among other things) pushes the baby outside by setting in motion (other) powers existing in the womb. (3.55.27-39)

*) Another time we find nature (ṭabīʿa) in a creating role. (3.56.34-37)

When birth takes place first the heavy part, then the light part come out, this in accordance with the power of the Benevolent (3.56.28). Furthermore divine providence prevents the sudden flow of the menstrual blood and leads it quietly into the veins (3.50.10-12). The position of the fetus in the mother's womb is ideal because of God's providence (3.52.20). It is also divine care that is devoted to the preservation of all kinds of animals. (3.55.13-16) As mentioned earlier divine wisdom has planted the power of intercourse in every living being (3.44.17) and this same wisdom sees to the preparation of the mother-milk (3.50.30-51.9) and decides that the fetus should feed from its mother (3.51.9-11). Divine wisdom made the fetus into a ball to be protected as optimally as possible. (3.53.2-5)

In survey: it is clear that divine influence, divine power(s), the divine creative faculty, divine care, providence and wisdom appear in every part of the embryology. Striking is the connection of the divine factor with all kinds of powers, a factor still to be mentioned (see chapter 4.2.3.) Most powers are said to be exclusively divine. The divine factor seems nevertheless to be confined to a vague role: nothing actual is said: God creates, God makes appear, God cares, God is wise. More real evidence of God's influence is that the survival of the species, the preservation of life and kinds is attributed to him though assisted by the power of intercourse and the creation of the sperm. Two times other factors have a creating role: the designing power and nature.

4.2.2. The astrological factor.

The astrological factor is the second factor we mention which influences the embryology. As we will see below (chapter 4.2.9.) Qazwīnī presents three descriptions of the actual formation of the fetus of which one has an astrological background. In the astrologically oriented description he describes the situation of the fetus in each of the 9 months.(see 3.3.II) He gives the embryological developments in each stage telling us under the influence of which celestial body the fetus is according to the astrologers. Thus he comes to the following sequence:

- the first 30 days and 72 hours the fetus is under the supremacy of: Saturn
- until the end of the second month under: Jupiter
- until the end of the third month under: Mars
- until the end of the fourth month under: the Sun
- until the end of the fifth month under: Venus
- until the end of the sixth month under: Mercury
- until the end of the seventh month under: the Moon
- until the end of the eighth month under: Saturn again
- until the end of the ninth month under: Jupiter again

It should be mentioned that only the supremacy of the celestial bodies is mentioned and not what this supremacy or influence consists of. Besides no more astrological influence can be detected in the text.

4.2.3. The factor of the powers.

In Our text we are confronted many times with the appearance of a power or powers (quwwa/quwā). It is said that the powers are the soldiers of the soul endowed with reason (an-nafs an-nāṭiqa)(M fol.144). Furthermore we see that the brains are created as a residence for the soul-like powers (al-quwā an-nafsāniyya) (M fol. 5b.1) and the heart for the animal-like powers (al-quwā al-ḥayawāniyya) (M fol.5b.2.). A first example of these powers is the mechanism of digestion of the food which is the first power to affect it, sustained however by natural heat. (3.44.7-9). The designing power has extended the male organ because of its excess of heat and it has left the female organ be directed inward because of a lack of heat (3.56.30-33). It is the same power that decided to create the penis from a hard kernel with a cavity (3.57.35-36). We also find powers in the sperm: the male sperm has curdling power and the female sperm has attracting power, a power to be curdled (3.45.14-16). Both have a heating, crushing power as well (3.45.16-17). The male sperm, once again, has an attaching power because of the action of the pneumata (riyāḥ) in it: it attaches itself through them like the claws of a predatory animal on its pray (3.45.17-20). The testicles give the matter which changes into sperm its creative power (3.57.10-11). The air, it says, might affect the power of the sperm (3.57.29). In both kinds of sperm one finds a shaping force (3.53.28 and 32) The child will resemble the parent whose seminal power is the stronger. (3.54.1-2)

Then it is the power of intercourse in cooperation with the semen, both of a divine origin that guarantees the survival of the species (3.44.15-20). In conception the pushing power pushes the sperm of the male from the seedvessels to the cavity of the womb (3.37.1-3). In the womb a power is created that has the female sperm attracted (via the oviducts) to the male sperm when the latter has reached the womb. (3.46.31 - 47.2) Then, if natural heat is perfect at the moment of conception a male child is the result with strong masculine characteristics. If it is lacking however, the degree of masculinity will be less strong. (3.53.12-17).

All powers now are existent in the essence of the sperm (3.51.12). The molding power mixes together the grease of the sperm, the mixed pneuma and reserves part of it for the creation of heart, liver and brains. (3.45.30-46.4) In the initial stages of the formation of the embryo these powers are very active: they form flesh, membranes (especially through the power of heat (3.49.4) and the vessels in them, (see 3.51.12-16) and after that all powers get into motion, such as:

the changing power
the shaping power
the power that makes tools
the power that makes tracts
the joining power
the separating power (all in 3.51.16-19)

And all these powers have one single aim: the perfection of the shape. (3.51.25) All are called divine powers (3.51.25).

Further, it is also the divine power which prevents the fetus from moving itself to early (3.52.4) when its body is still too soft. The pulling power attracts nourishment to the fetus.(3.50.12-13) but only fitting food (3.50.23-26); food that has been changed by the changing power into pure blood. (3.50.23-26) The fetus for its own part needs a feeding power to grow and obtain power for itself (3.52.8-11). In the eighth month the strength of the fetus is weak (3.48.23) and after birth the powers of the fetus are still weak (3.50.34). At the time of birth the divine power pushes the fetus outside, using the powers existing in the womb (3.55.28-30). It is then that the retentive power stops functioning (3.56.1-2). The pressing power pushes the fetus outside and the fetus itself helps in this process by means of its own power.

In survey: it seems impossible to decide whether a power is of a soul-like character or of an animal-like on which is the original division of the powers. In the formation of the fetus we distinguish powers of a specific divine nature but they do not seem to be of a special working kind. We already noticed in chapter 4.2.1. that divine influence appears to cover everything.
The fetus itself gets powers of its own. These powers seem to be of a more innate character than the others. These powers belong to the fetus whereas the other powers are of a rather obscure origin except that they can be divine which is however rather vague as well.
That the powers are rather important though is proved by the fact that one whole chapter is dedicated to them (Chapter V of the embryology. 3.51-52) Important is our observation of the cooperation of powers with heat, a factor still to be discussed. (4.2.5.) In some cases the powers are dependent on the degree of heat: the formation of male and female reproductive parts for example and the formation of the membranes effected by the power of heat itself. Also the degree of masculinity is dependant on the degree of heat at the moment of conception. Here the powers have a more tangible aspect: heat.

4.2.4. Spirit, soul and pneuma(ta).

the spirit:

In the introduction to man (M fol. 144) we read that man's essence is twofold: a body (badan) and a spirit (rūḥ). In the introduction to the anatomy (M fol. 154a) we read that the connection of an elementary body (badan ʿunsurī) with a heavenly spirit (rūḥ samāwī) is a marvel. The spirit is mentioned with respect to the fetus as well: In the fourth month of its formation the angel blows the spirit into it (3.47.28) and thus, it is said the animal soul streams into it (see 'the soul'). Later on it is said that the spirit of the fetus is strong in the ninth month. (3.48.29) Then the activities of the animal soul appear in it. (3.48.29-30)

the soul:

We also detect the existence of the soul (nafs) In the introduction on man (M fol.144) it says that for the soul endowed with reason (an-nafs an-nāṭiqa) the brains are made to serve as a residence. They reign over the elements of sense (jawāhir ʿaqliyya). In the first introduction (M fol. 5b 1) it says that he (God) created the brains as a residence

for the soul-like powers (al-quwā an-nafsāniyya) and the heart for the animal-like powers (al-quwā al-ḥayawāniyya). In the anatomy we read that the brains are the source of the soul-like pneuma (M fol.160b) (ar-rūḥ an-nafsānī). We read the word 'nafs' as well in 3.31.12: all powers are present in the 'nafs', essence of the sperm. Again we mention that the angel blows the spirit into the fetus so that the animal soul (an-nafs al-ḥayawāniyya) streams into it. (3.47.28) Later on the actions of the animal soul appear (3.48.29). Thus the 'fetus' actually gets a soul. It is mentioned that at first its soul is still too weak to feed itself but that later on the soul acquires strength.(3.50.17-20)

the pneuma(ta):*)

In the anatomy we read that the brains are the source of the soul-like pneuma (rūḥ nafsānī) (M fol. 160b) which flows from the brains to the rest of the body via the nerves ('aʿṣāb). The heart propagates blood and animal-like pneuma. (rūḥ ḥayawānī) (M fol. 161 a) and from it they both flow to the rest of the body via the arteries. The liver, which is softer and moister than the heart, contains the natural pneuma (rūḥ ṭabīʿī) and nourishing blood which flow from it to the rest of the bodily parts via the veins (M fol. 160a). These three pneumas we find back in the grease of the sperm which is described as the mixed pneuma, (ar-rūḥ al-mukhlāliṭa). It is mixed together through the molding power and parts of it are taken as a preparation for heart, brains and liver: the three residences of the three pneumas.(see 3.45.30 - 46.4)
In 3.58.35 we read a confirmation of the sources of the pneuma(ta): blood and pneuma come from the heart and the liver to the right cavity of the womb. 3.49.24 says that the advantage of the placenta is its mediating function in transporting blood and pneuma to the fetus. Furthermore we find ourselves confronted with lots of pneuma mingled with the substance that will eventually change into sperm (3.45.1.) Later, when 'the need is there' the pneuma arises and fills the cavities of the penis so that it grows and the sperm can go to the end of the penis and reach into the female organs (3.45.4-8). The pneuma assists in the erection and relaxation of the penis by filling and leaving it. (3.57.37-40)

*) The Arabic words for pneuma(ta) are threefold: روح , ريح / رياح and نفخ Sometimes روح is translated as 'spirit' if the context made this translation more appropriate. (see 'the spirit') The Arabic words are mentioned anyhow in the translation.

Furthermore one reads that in the sperm of the male there is attaching power because of the pneumata which have the effect of claws of a predatory animal on its prey. (3.45.17-20) Pneuma also assists in fixing the embryo in the womb and in opening the feeding canals from the mother to it. (3.45.20-27)
Finally we mention the appearance of the pneuma (nafkh) together with the formation of the membranes and the blood-vessels in them done by the powers (3.51.14-16).

well of life:

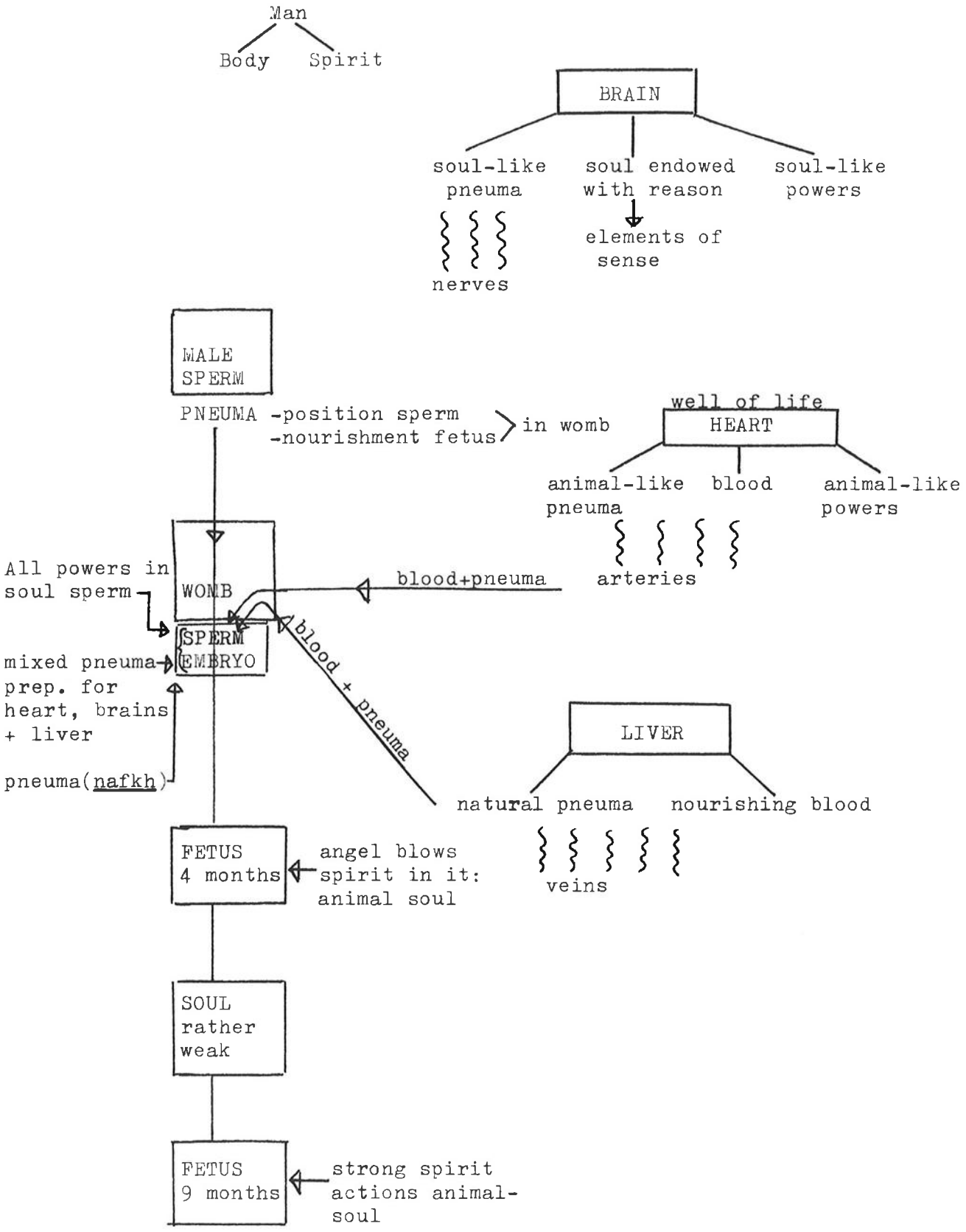
A special remark should be made on the heart, which is the residence of the animal-like powers (M fol. 5b.1.) but which is also the well of life (yanbū' al-hayāt) (3.52.39). See sketch page 73.

We shall not try to give a complete exposé of this representation but confine ourselves to some remarks: Spirit and soul seem closely connected with each other as they are mentioned in the same breath many times. It is clear that pneuma plays a very important role. Its foundations are laid early in the grease of the embryo, the mixed pneuma. Not mentioned is the transportation of soul-like pneuma from the brains to the womb. Just as man is said to consist of body and spirit, so is the fetus: it has a body and later the spirit is blown into it.
Further the soul endowed with reason is not mentioned in connection with the fetus. The animal soul is not mentioned in connection with the heart of which one would think that it is its base.

4.2.5. The factors of heat and cold.

More substantial factors than the foregoing ones influencing many spects of the embryology are the factors of heat and cold. Automatically one connects the qualities of heat and cold with the qualities of dryness and moisture (the four qualities of which more in Part B).*)
Returning to the qualities of dryness and moisture, they seem to play a rather minor part in Qazwīnī's embryology. They are active in a rather practical way: the anatomical genesis of the embryo (3.46.12), in connection with the membranes (3. Ch.III) and moisture supports in birth

*) These four qualities are traditionally connected with the four elements: fire, air, water and earth. These are mentioned in the introduction to the anatomy. It says that these opposed elements are miraculously joined together in the human body. (M fol. 144a)


Man
Body
Spirit
BRAIN
soul-like pneuma
soul endowed with reason
soul-like powers
nerves
elements of sense
MALE SPERM
PNEUMA -position sperm -nourishment fetus
in womb
well of life
HEART
animal-like pneuma
blood
animal-like powers
arteries
All powers in soul sperm
WOMB
blood+pneuma
SPERM EMBRYO
mixed pneuma prep. for heart, brains + liver
pneuma(nafkh)
blood + pneuma
LIVER
natural pneuma
nourishing blood
veins
FETUS 4 months
angel blows spirit in it: animal soul
SOUL rather weak
FETUS 9 months
strong spirit actions animal-soul

(3.56.21). Heat and cold have a much more theoretical role. Let us consider the following:
It is innate heat that assists the mechanism of digestion purifying the food that has reached the stomach. (3.44.7-9) Later on the food is cooked well in the liver once again (3.44.10-11).
Furthermore we find the heat active in the procreative organs. The designing power extended the male organs because of their excess of heat and it left the female organs directed inward because of their lesser heat. (3.53.11-12 and 3.56.30-33) Then, with respect to the womb: its right side is of a hotter composition than its left side so that the right side is fit for creating a male and the left side for creating a female fetus. (3.58.33-38).
Of the sperm it is said that both sperms have a heating, crushing power (3.45.16-17) and of the (male) sperm it is mentioned that it is a moist, sticky hot substance. (3.44.26 - 5.1.)
One of the decisive factors why a fetus turns into a male is that God created in the substance he makes males out of a greater heat than in the substance he makes females out of. (3.53.7-110
About conception: if the innate heat is perfect at the moment of conception a masculine male is the result. If it is lacking however a feminine male is the result. (3.53.12-17)
Later on it is mentioned that warm circumstances and an age of maturity contribute in creating a female whereas the opposite contributes to creating a female (3.54.6-10).
Another source says that the reason for a fetus to be a male may be in the condition of the male sperm and its heat (3.54.11-12).
The power of heat also plays a role in the formation of the membranes (3.49.4) and in the second month God introduces a heat to the blood-clot (3.47.13-14). Later on there is an increase of heat so that the blood-clot becomes a piece of red flesh. (3.47.18-20). Thus, in short:

A) innate heat assists in mechanism of digestion

B) hot: male proc. organs — less hot: female proc. organs
   hot: right side womb — less hot: left side womb

C) heating power in male ánd female sperm

D) male sperm is of a hot substance

E) extra heat in substance → male
   lack of heat in substance → female

F) conception when innate heat is perfect → male
conception when innate heat is deficient → female

G) warm circumstances → female
cold circumstances → male

H) male sperm hot → male fetus

J) heat assists in - formation membranes
- formation fetus

From this outline we can conclude that heat has a constructive quality. It helps to digest the food. It assists in the formation of membranes and of the fetus. Both seminal fluids are of a warm disposition but it turns out that the male sperm is hotter. The factors of cold and heat play a very important role in the future sex of the child. Generally a man is hotter than a woman. Several times heat is mentioned in connection with the powers.

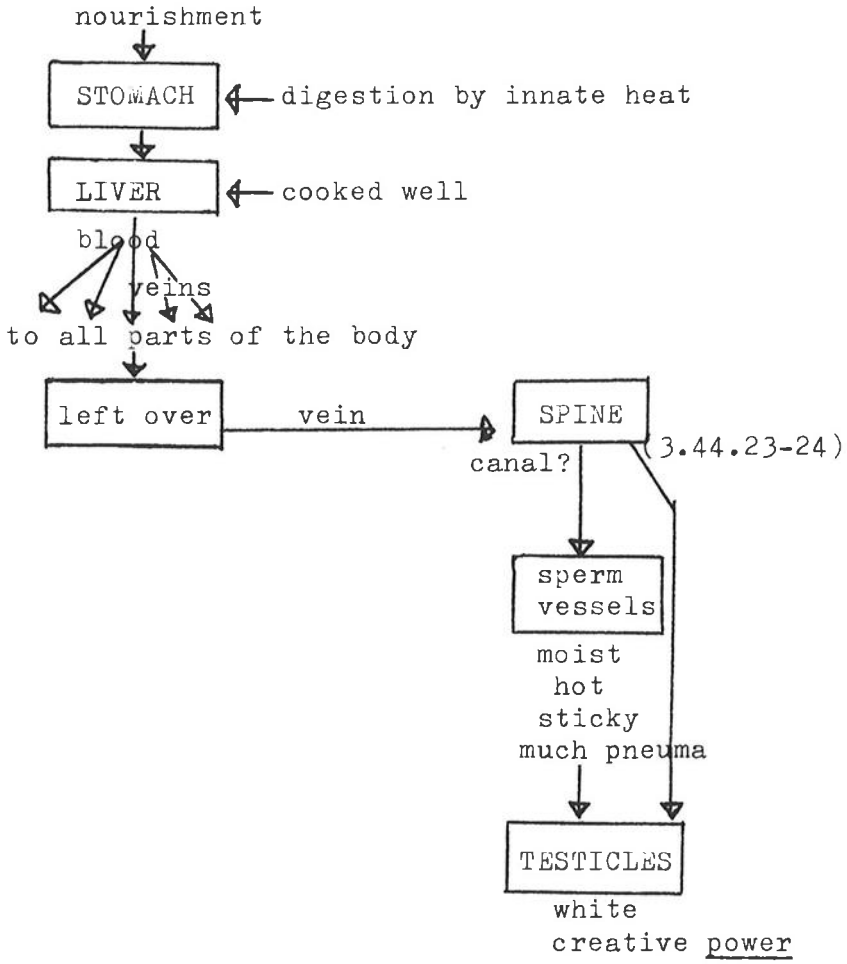
4.2.6. Male and female sperm; the menstrual blood.

The preceding five factors (chapter 4.2.1 - 4.2.5.), influencing more or less the totality of the embryology all have in common that they are of a rather invisible and with respect to the first four, a metaphysical character. In this chapter we will speak on more substantial processes and substances that contribute to the embryology of man. It is on the genesis of male and female sperm and on the role of the menstrual blood in the genesis of the child.

A very complex thing we find ourselves confronted with is the multitude of notions in this area and their seeming to have more than one meaning. The word 'nutfa' generally means 'sperm', male or female, but in some contexts I am inclined to translate it as embryo. In 3.5.23 it says that a membrane surrounds the sperm (nutfa) whereas in 3.8.35 it says that the first membrane is formed on the attachment surface of the fetus (janīn). With both membranes the placenta is meant. Also in other occasions nutfa is used but I was inclined to translate it as embryo. (see 3.43.1-5,42.13, 43.4-5,45.31, 47.7-8, 51.12) By many also sperm, male or female is meant. In one instance however it seems to mean embryo (3.50.8) *) In the translation all Arabic words for sperm are mentioned after their translation: nutfa, mādda ('proto-sperm'), many, zarᶜ .

*) The occasions where nutfa or many means embryo/fetus in my view are discussed in chapter 4.2.8. and 4.2.9.

development (male) sperm



On male sperm: (See the sketch above) When nourishment has reached the stomach and it is purified in it by the mechanism of digestion assisted by innate heat it goes to the liver where it is cooked well (3.44. 9-11). In the anatomy (M fol. 160a) we read that the liver converts the food into -nourishing - blood and as this is transported through the veins we will accept this converted food to be blood although Qazwīnī does not mention it as blood in the embryology. Then the purified rest (blood) is distributed over the body and from what is left over a part is taken which is sent via the veins to the spine (3.44.11-13, 20-23) and in one occasion it goes directly to the two testicles where it turns into the nature of sperm, (3.44.23-24) but in another occasion (3.57.7-8) it first goes to folded veins surrounded by swollen flesh (the sperm-vessels) where this rest is formed into a moist, sticky, warm, substance mingled with much pneuma (3.44.26 - 5.2). In 3.45.3 the seed vessels of 3.57.7-8 are called hyper-sensitive. In the seed-vessels the substance is prepared to become sperm (3.57.9).

In the testicles finally it gets white (3.45.3) and in them it gets the quality of creative power (3.57.11-12). The sperm contains a heating, crushing power and an attaching power (3.45.16-17 and 18). It is a substance for procreation, for the preservation of the species (3.44.15-21). It contains a form giving principle and it is also a substance which contains the principle of shaping something from it that is the like of the thing it separated itself from.(3.53.28-33) Its nature is restless (3.44.24-26). Its heat plays a role in the possible male sex of the child (3.54.12). The Koran mentions in our text (3.46. 22-28) the change of clay (ṭīn) into sperm (nuṭfa), (or is it the embryo here ?). Qazwīnī does not pay further attention to this development from clay to sperm.

The development of the sperm, sketched above seems to be confined to the male sperm only. Nothing is said on the origins of the female sperm specifically. Above all, when the origin of the (male) sperm is mentioned, it mostly continues with the function and activities of the male sperm specifically and not of the female's.

On female sperm: The female sperm seems to be stored in her testicles where it gets a creative power as well.(3.57.10-12) Nothing is said on eventual developments before its being in the testicles. Several times it is mentioned that the female sperm is pulled to the womb via the oviducts (3.59.2-3,57.17-18, 45.10-11). On the female sperm is said that it has a heating, crushing power as well and a power that attaches (3.45.16-17, 15-16). It also contains a formgiving principle and the principle of shaping something from it that is the like of the thing it separated itself from (3.53.26-27, 32-34). It is not specifically mentioned that it is the female sperm that guarantees survival and preservation of the species, though it has a creative power.

The menstrual blood: The menstrual blood plays two roles in the genesis of the embryo: it has a nourishing role and a generating role. Menstruation itself is described in chapter IV of the embryology (3.49.33-50.5) In menstruation the veins of the womb are closed and opened suddenly. In the case of pregnancy however the veins are open already: they are connected with the fetus (3.45.20-30). The menstrual blood flows to the fetus, nourishing it (3.42.11-12, 50.14-18, 45.20-30). The menstrual blood comes from all parts of the body (3.42.9-10, 49.34-35). The menstrual blood is pure, changed by the changing power.(3.50.23-26).

It is clear that the nourishment for the fetus comes from its mother (3.52.10-11). Later on during pregnancy when the fetus moves and its shape is completed and the moment of birth is near, the menstrual blood rises to the breast, through widened tracts where it changes into milk so as to feed the newly-born with an appropriate nourishment. (3.50.27 - 31.9)

A much more essential aspect of the menstrual blood is its generative power. We quote:

3.42.7-9: ...the sperm (nutfa) comes out... the menstrual blood is drawn from the depths of the veins...they are brought together in the wombs.

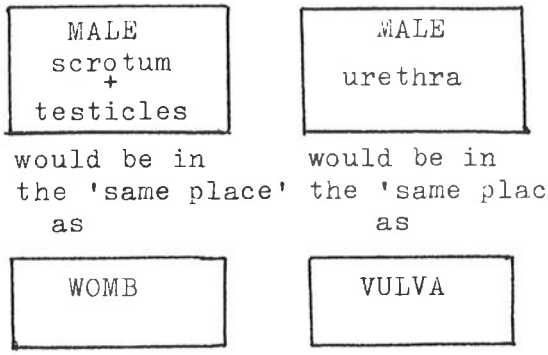
3.46.32 - 47.8: when both sperms (male and female) are drawn together in the womb, the menstrual blood draws it to itself and it dries up around the sperm.

3.46.21: the flesh of the fetus originates from the menstrual blood

4.2.7. Anatomy and functions of the procreative organs. *)

Essential for the genesis of man are the procreative organs. "Testicles and procreative organs are for the fulfillment of desire and the survival of the species !" (3.43.2-3) In the introduction to Qazwīnī's anatomy (M fol. 144a) we read that the anatomical parts of man are made of a 'first mixture of humours' (akhlāt). There are two kinds: single parts and they are called uniform parts and compound parts. Last ones are divided into outer (ẓāhir) and inner (bāṭin) parts. Examples of single parts are 'bones', 'flesh', 'veins', 'membranes'. Examples of outer compound parts are: 'the eyes', 'hair', 'the breast'. Inner compound parts are for example: 'brains', 'heart', 'liver', 'stomach' and the reproductive parts. The compound parts are built from the single parts. One basic principle is operative for both the male and the female procreative organs: they are uniform, which means: two of a kind (the uniformness of the single parts cannot be meant here as here we are dealing with compound parts). It is only that the male organs, due to their excess of heat, are extended and that the female organs due to their lack of heat are led inward. But basically they are the same. Suppose the male organs would lie inward, then:

*) Most information of this chapter is taken from chapter 3.4. If not, the reference is mentioned.



there is only one difference:
the female testicles lie outside
the womb.

the male procreative organs:

the sperm vessels: folded veins, surrounded by swollen flesh, veins with a strong sensitivity (3.45.2.) There the remainder of the food comes from the spine and is prepared to become sperm.

the testicles: there are two, one on the right and one on the left, lying in the scrotum, the bag, both containing sperm. There the sperm is given a creative power. The testicles consist of solid swollen flesh.. Because of their shaking the sperm becomes white (3.45.3-4). From the testicles two ducts led to the urethra in the penis. The ducts are meant for the transportation of the sperm.

the penis: is connected to the pubic bone. It hangs in the middle and highest point of the pelvis. Under it run two arteries and many veins. Its kernel is hard with many cavities so that the pneuma can fill it at times of conception. Its core is not made of bone but of a mixture of connective tissue and nerves (generation is not continually wanted). Nerves to support the swelling and connective tissue for its connection to the bone. In it is the urethra through which the sperm passes. The penis must swell to reach into the mouth of the womb in order to thrust the sperm into it without coming into contact with air or any alien body which would affect its strength and in order to open the vulva so that it becomes wider and the sperm can flow into it.

the female procreative organs:

the sperm vessels: do not seem to be a part of the female procreative organs. When they are mentioned (3.45.1-2, 57.6-10) they are generally connected with the genesis of the male sperm, and not specifically with the female's.

the testicles: there are two as well, They lie outside the womb and they are smaller than the male's and flatter but also made of solid, swollen flesh. They play an important part in the future sex of the child (see 3.VII)

the oviducts: (protuberances or horns): From the testicles the female sperm flows to the cavity of the womb through the 'horns', the oviducts.

(3.45.10-11) The sperm is also pulled through them by the womb.
the womb: The womb also contains many nerves so that it is very sensitive. It must be sensitive, it must be able to stretch during pregnancy and afterwards it must restore itself to normal size again. It is placed between the bladder and the large intestine, the most proper place for the genesis of the fetus, its growth and its birth. It has two cavities, one to the right side and one on the left side playing an important part in the future sex of the child (see 3. VII) The right side is hotter and stronger than the left one because blood and pneuma come to it directly from the heart and liver. The womb is connected with flexible ligaments to the spinal cord and other parts of the body surrounding it so as to remain in its place and so as to be capable of pregnancy and birth.
the vulva: is the neck of the womb. It ends in the mouth of the womb which is closed in a virgin and also when a woman is pregnant. Then it only opens up in case of an untimely (spontaneous) abortion or-of course- at the time of birth.The womb and the female sperm dripped in the cervix pull through it the sperm of the male that goes from the end of the penis to the orifice of the womb.(3.45.8-12)

4.2.8. The process of tawallud al-insān, the genesis of man.

As to the important issues in the genesis of man they may be summed up in the following points:

I-the contribution of the male and the female to the generation of the embryo.

II-what causes the fetus to become a male or a female

III-what makes the child resemble one of its parents

ad I the contribution of the male and the female to the generation of the embryo

Several descriptions are given for the contribution of the male and the female to embryo formation. To begin with, in the first introduction one reads that in the womb the male sperm (nutfa) and the menstrual blood, mix. (3.42.7-9). (Not mentioned is however the actual formation of an embryo.) Directly after this the text reads that the newly born is created from two sperms (nutfatān) (3.42.10-11) In 3.45.12-13 it says that the two sperms (nutfatān) mix and a nutfa is the result (3.45.23). The last nutfa should be translated as embryo.(see on this problem also chapter 4.2.6. and 4.2.9.) In the note in chapter 3 page 44 we read that when the (male) sperm (nutfa) has attained the womb, the

sperm of the male and the female mix in tne form of a ball. The two substances are somewhat different however. The male sperm has the power to attach itself and the female to attract. The male sperm has a curdling power and the female's a power to be curdled. (see 3.45) Both are said to have a heating, crushing power: probably useful in their mingling. Of the male sperm it is said that it is restless and tickles: it wants to get out (3.44.24-26): this prompts sexual intercourse (note 3.44) The womb draws the female sperm from the female testicles and the sperm of the male is drawn to the female sperm through the vulva (3.45.10-12,59.1-4). Further: especially the male's sperm is meant for the survival of the species and the sexual drive gives an impulse to its activities (3.44.16-21, 24-25 +note). Very interesting is the notion that can be read in Chapter II of the embryology: the male sperm (nutfa) arrives in the womb and attracts the sperm, no doubt the female's, to itself. Then the menstrual blood pulls it (the nutfa) to itself and it dries up around it. Here nutfa can mean both the mixture of male and female sperm or male sperm only. Not female sperm as the male sperm establishes itself in the womb (mentioned two times) and then the menstrual blood dries up around it. The establishing and the drying up are clearly connected in the text.
After the effect of heat on it it becomes a blood-clot.

Thus, in short: an embryo comes into being through:

1) the mingling of male sperm and female sperm
or 2) the mingling of male sperm and menstrual blood
or 3) the mingling of male sperm (and female sperm?) with the drying up of menstrual blood around it.

II what causes the fetus to become a male or a female.

The text dealing with this subject, principally chapters VII and VIII of the embryology, is very complex. It should be noted that all the information it contains on this subject is introduced by quotations. Here Qazwīnī quotes on the authorities of others explicitly. Analysing the sections about this subject we come to the following scheme:
the cause for the fetus to become a male or a female can be:

*) References to the text are left out as we follow the text of chapter VII and VIII rather closely.

Quotation:

One of them asserts:

1)-the child becomes a male because of an increase of heat in the matter **males** are made of.
-the child becomes a female because of a lack of heat in the matter females are made of.

2)-if the innate heat is perfect at the moment of conception a masculine male is the result.
-if the innate heat is less a feminine male is the result.
-the same degrees are valid for females, from feminine females to masculine females. In this ranking however innate heat is not mentioned in the text.
-in between the feminine male and the masculine female one finds the hermophrodite. In the womb, the text says this situation shall be shown, but it is not mentioned anymore.

They maintain:

3)-the dominating principle for the genesis of a male is its obtaining a position in the right side of the womb.
-the dominating principle for the genesis of a female is its obtaining a position in the left side of the womb.
By 'it' no doubt nutfa is meant, in this case the male sperm.
This third description is followed by a very strange remark:

3a)-warm circumstances and an age of maturity contribute in creating a female
-the opposite of these contribute in creating a male.
This sounds rather odd as one would expect that warm circumstances are an advantage for the genesis of males (see 1)).

An outstanding scholar has said:

4)-the origin of the male sex lies 1) in the condition of the male sperm, 2) its heat, 3) sexual intercourse at the moment that the woman is ritually clean, 4) the appearance of the sperm from -his- most right, warmest side (the right testicle), 5) its reaching the right side of the womb, with the same strange remark that:

4a)-cold circumstances and an age of youth assist in creating a male.

Some people claim:

5)-if the male sperm flows from:			it becomes:
his right side	to	her right side	a male
his left side	to	her left side	a female
his right side	to	her left side	a feminine male
his left side	to	her right side	a masculine female

Further in the chapter on the procreative organs we find the following information:

6)-the womb has two cavities: the right one is hot and strong, fit for the genesis of a male; the left one is the opposite of it, fit fot the genesis of a female.

In chapter VIII we read:

They say:

7a)- a male is begotten if the sperm is ripe, with a fitting blend for a male.
-a female is begotten if the sperm is not ripe, with a fitting blend for a female.

7b)-what falls in the right cavity of the womb will be a male.
-what falls left will be a female

7c)-if both drops of sperm are equal, twins are begotten, pairs of boys or girls.

The sperm of 7a probably is the male sperm but in 7c both male and female sperm must be meant. The equality probably means that both are ripe or not ripe.

In summary there seem to be three possible processes:

1-With the factor of the heat at the moment of conception: the hotter the more male, the more tepid, it seems, the more female (point 2)

2-The condition of the sperm. If it is hot or ripe a male is conceived. If it is not or unripe a female is conceived. If both sperms are equal, twins are begotten (point 1), 4^1), 4^2), 7a), 7c))

3-The flowing of the male sperm from the right or the left testicle to the right or the left cavity of the womb bearing in mind that the right testicle is the hotter just as the right cavity of the womb is. (point 3), 5), 6), 7b), 4^4), 4^5))

Problematic remains the notion that warm circumstances and an age of maturity contribute to creating a female (point 3a)) and the opposite of it a male (point 4b)). Problematic is also where point 4[3]) belongs. On the creation of a hermaphrodite the text says that this situation will be shown in the cavities of the womb. Does that mean that besides the factor of heat influencing it, also the place where the sperm 'lands' in the womb induces the creation of a hermaphrodite: it lands in the middle of it because if it lands right a male is conceived and if it lands left a female is begotten. This seems plausible and thus description 1) shows overlap with description 3).

III What makes the child resemble one of its parents.

Information on this subject can only be found in chapter VII. (3.13.26-14.2) It says that both sperms contain a formgiving principle, which aims at resemblance with the parent it is derived from. If one of the sperms is stronger the child will be the like of the parent the stronger sperm is from.

4.2.9. The formation of the fetus.

The formation of the fetus is described in different ways, namely descriptions that differ from each other and that overlap each other. It makes up a very complicated matter. It is chapter I, II, II and V that deal mostly with it. The first introduction and chapter IV also contain parts dealing with it. We will first sketch the development according to chapter I in combination with information of the first introduction (see chapter 3.2.). In chapter I we make use of note 3 as well. Inserting this piece in the text it fits best in p.44 line 30, after *). In this way the embryological order seems to fit at best. We then get the following picture:

First description:

days: The male sperm (nutfa) reaches the womb. Male and female sperm (nutfa) mingle there. They become like a ball. The heat of the womb affects it. A thin cover is formed.(the placenta as will be shown). The nutfa is attached in the womb through the actions of the pneuma and the pneuma takes care of the piercing of the membrane (placenta) as well and of the openings of the veins in the womb connecting the latter with the

nutfa so that it can feed itself with good nourishment. Bad nourishment stops short around the placenta, to assist the getting out at the time of birth. The molding power mixes the grease of the sperm (nutfa), the mixed pneuma and takes parts of it as a preparation
6 for heart, liver and brains. Then the hilum is created.
9-10 All this happens in six days. The nutfa gets lines and spots (see also 3.43.4-5). The menstrual blood penetrates
15 the entire ball. It becomes an ʿalaqa a blood-clot (see 3.47.5-19) The moist clot is converted into flesh with uniform parts and limbs. The moisture of the spinal
27 cord expands: it is the basis of the body.
The head, both shoulders, limbs and belly are formed. All these developments are completed in maximally 45
35 á 45 and minimally 35 days. The male develops more quickly than the female.
after 45 days Then the bones are clothed with flesh that is generated from the menstrual blood. Our text says ʿizāmuhā but texts of the first variant say ʿizāmuhu and one could conclude that for the first time janīn is meant in stead of nutfa or ʿalaqa (see Ruska p.50)

Second description:

It is taken from chapter II. It is introduced by a quotation: they assert:

days
The (male) sperm (nutfa) establishes itself in the womb. It draws the (female) sperm (nutfa) to itself. Then the menstrual blood attrackts the nutfa (The mixture of the two nutfas ?) (see chapter 4.2.8.) and dries up around it. The nutfa coagulates through heat. It becomes a
30 days+72 hours blood-clot. (ʿalaqa) It remains an ʿalaqa for 30 days and 72 hours.
Heat appears in the clot. It solidifies. It is exposed
until 2 months to shaking and trembling.
Then the temperature rises. The ʿalaqa becomes a piece
until 3 months of red flesh, a mudġa ḥamrā'.
Then the assembling ot the parts which together build up the body is complete. The process of anatomical creation

has come to maturity. The spirit is blown into it by
until 4 months the angel. The animal-soul flows in it. The process of creation is finished. The whole construction is completed. The shape of all limbs has become distinct.
until 5 months All ducts are formed.
until 6 months Next the fetus starts moving, wakes and sleeps intermittently. Subsequently its flesh grows, getting stronger and more solid. It wants to get out and if God has predestined it thus, it will come out. If he
until 7 months has not, it will not be born. If it comes out however it is perfect. Hardship and trouble afflict the fetus as a result of the confusion in the seventh month when it wanted to get out. Therefore it is ill for 40
until 8 months days. If it is born at this point it lives very seldom.
(+ 10 days) In the last stage the fetus's make up is completely
until 9 months finished. The animal-soul becomes active.

Third description:

The third description is taken from chapter V, on the powers.

days: All powers are present in the essence of the sperm (nutfa) already. First they encompass the sperm (nutfa) with flesh. Then they form membranes around and the blood-vessels in it, together with the appearance of the pneuma. Subsequently all powers are set in motion all together aiming at the perfection of the shape at the same time: they separate the head from both shoulders and form it on the neck. They separate arms from the ribs, legs from each other, the fingers from each other. Every part gets its suitable form. They finish after 30
30 - 40 to 40 days. Then every organ is fed with the general food supplied to the fetus. Then the fetus starts to move when its construction is solid. It has power enough
3rd - 4th month to move itself. This in the third and fourth month.

Fourth description:

A very small description is found in the first introduction: (3.2.1-18)

God created the new born from two sperms. It is fed through the menstrual blood so that it grows. He cut the parts of the nutfa into uniform parts and from those the outer limbs were formed. Further in the text (not in our translation) we read that bones are created from a fine nutfa. (M fol. 4b. 9-10)

Some additional remarks.

The part of chapter IV (3.50.5-19) on the nourishment of the fetus described from the anatomical point of view fits best in the first description with the penetration of the menstrual blood in the entire ball. Important in it is that the many (sperm or fetus) impedes the sudden flow of the menstrual blood together with the membranes and covers.

Chapter III, on the formation of the membranes, is written so lucidly that we shall refrain from repeating it here. It fits in best with the first description. It says that the placenta (mashīma) is formed after seven days and that the other membranes are formed subsequently. This fits in with the first description according to which the placenta is formed within the first 6 days. It does not mention the other membranes.

Some remarks should be made on the foregoing descriptions:

A considerable problem constitutes the translation of the word 'nutfa' and one time 'many': when is it sperm, male or female and when is meant the first embryological phase ? We may translate nutfa as 'drop' when the first embryological phase is meant. Thus we are inclined to translate 'drop' in the first description when the ball is formed; in the second description when the menstrual blood draws the nutfa to itself unless male sperm is meant by nutfa. (see chapter 4.2.8.) In that case no drop-phase is there, but after conception an ʿalaqa is formed immediately; in the third description we conceive the essence of the sperm as the essence of the drop.

- Striking, too, is the Korantext at the end of the first description. It is quoted there as an illustration for the developments drawn in it. But it seems more apt to be applied to the second description. Several embryological stages are mentioned in it: 1) ṭīn, clay
2) nutfa, drop
3) ʿalaqa, blood-clot
4) muḍġa, piece of flesh
5) bones and flesh appear → janīn fetus

and then it is raised to the status of crature.
Further we can detect principal differences between the descriptions:
- In the second description the formation of all parts and limbs is not finished until the third and fourth month while the first and third description have a perfect shape already after 40 or 45 days. It seems rather odd for the first description that the flesh and bones are formed after the limbs but this is mentioned only to adapt to the Korantext in it in our view. In the second description the fetus remains an unidentifiable ball much longer than in the first and third description. Maybe this is to bring it into harmony with the 9 celestial bodies. Each body is supposed to influence a phase in the embryology. Thus the embryological developments were made compatible to these 9 phases.

Final remark: The chapters on the position of the fetus (VI) and on birth (IX) are written so lucidly that we will refrain from analysing them also because they do not contain much philosophical information which interests us most. (see also chapter 4.3.)

Part B DISCUSSION ANALYSIS QAZWĪNĪ'S EMBRYOLOGY

4.3. Introduction.

In our analysis of Qazwīnī's embryology we divided everything into factors and processes. We should not forget however that they are closely interrelated. This is even more evident when we trace the sources of Qazwīnī's embryology. This research takes us back to the Greek scholars of antiquity. There we can retrace all factors and processes we have touched on before. These, however, are só closely intertwined that one cannot distinguish between them easily. Thus part B does not follow part A completely. It deviates several times: spirit and soul are discussed in 4.4.1. and the pneumata in chapter 4.4.7. The anatomy and functions are discussed in chapter 4.4.5. which is on the quality of heat. The process of tawallud al-insān (chapter 4.2.8.) is discussed in three separate chapters (4.4.6., 4.4.7., and 4.4.8.) We have tried to follow the order but leaps must be expected.
In doing research on the embryology we confined ourselves mostly to the embryological ideas and philosophies (the theory) and left the anatomical aspects (the practise) more or less for what they are. Therefore for example the discussion of the anatomical genesis of the embryo does not occupy such a large place as its analysis in 4.2.9.
In considering the sources of the embryology we discovered them to be for the largest part from the Greeks. Therefore we mainly concentrated on them. Therefore the names of Hippocrates, Aristotle and Galen will be mentioned many times. On their basic ideas we read Singer's 'Greek biology and Greek medicine', Preus' article: 'Galen's criticism of Aristotle's Conception Theory' and May's introduction to Galen's 'On the usefulness of the parts of the body'. Galen is quoted directly from this work; Hippocrates 'Kitāb al-ajinna' is quoted directly but other works of them and of Aristotle are quoted via Singer, Preus and others since my knowledge of Greek is insufficient to quote them directly. Ibn Sīnā's al-Shifā' and the letters of the Brethern of Purity can be found in the analysis as well. To the so-called Pseudo Ibn al-Athīr will be referred as well. In the first instance we wanted to incorporate ʿAlī b. Rabbān al-Ṭabarī's chapter on embryology in his 'Firdaws al-Ḥikma' and Arīb b. Saʿīd al-Kātib al-Qurṭubī's Kitāb khalq al-Janīn wa-Tadbīr al-Ḥabālā wa-l-Mawlūdīn as well but their information does not contribute that much to a better philosophical understanding of Qazwīnī's embryology and is thus left out.[7)]

The following works of the Ancients are cited indirectly:

of Hippocrates: De carnibus
of Aristotle: De partibus animalium
De anima
Historia animalium
De generatione animalium
De juventate et senectute, de vita et morte
of Galen: De naturalibus facultatibus

4.3.1. Islamic medicine in survey.[8]

In the Jāhiliyya-period, the time before Islam in Arabia, medical knowledge was confined on the position of the organs and superficial knowledge on their function. Medical treatment existed, based mainly on superstition. With the appearance of Islam, nothing really changed. The Koran mentions notions of embryology several times, but the verses are rather similar (sura 16:69-71, 23:12-14, last also quoted by Qazwīnī [9] and in the Pseudo Ibn al-Athīr [10]). The popular Jāhiliyya knowledge though found a new form in the so-called tibb nabawī, prophetical medicine, It would become the counterpart to the medicine based on the Hellenistic tradition. This tibb nabawī is based on utterances of the prophet Mohammed although the knowledge already existed before his time. Much is found about it in the compilations of prophetic traditions. Bukhārī even wrote a Kitāb at-tibb.
In the time of the Omayyads, until 750 AD, not much Hellenistic medical knowledge had filtered through to the new Islamic world. Physicians were mostly of Jewish, Persian, Greek or Syrian origin, practising a rather primitive Byzantine and slightly Hellenistic kind of medicine. It is firmly established that during the Ommayyad reign the antique texts of the Greeks were hardly spread. In the Abbassid period (until 1258 AD) however a wave of translations took place, especially in the eighth to tenth centuries. First translations were made into Syriac (also done during the Omayyads) but soon into Arabic notably by Hunayn b. Ishāq. In this new medical knowledge it was Galen whose ideas were predominant among the muslim scholars. It is also important to mention that Hippocrates was translated only in as far as his treatises stood in connection with Galen's works. He enters via Galen. In this time also Greek philosophical treatises became known to the islamic world. (Aristotle)
On embryology we refer to: al-Maqāla fī l-janīn wa-kawnihi fī r-rahim of Yūhannā Ibn Māsawaih (161 H/777 AD - 243 H/857 AD). (Weisser discussed

this treatise, see works cited no. 19 [11]). His description of embryology consists mainly of 'problems concerning the duration of pregnancy and the stages of prenatal development' based mainly on Pythagorean ideas. He derived the physiology from Galen and Hippocrates. Also Aristotelian influences are detected in it, notably in the contribution of the male and female in the formation of the fetus. But, as Weisser writes, describing Ibn Māsawaih's position in embryology: "The value of Ibn Māsawaih's embryology for the general history of medicine lies mainly in the fact that it preserves for us some traces of an embryological tradition of late antiquity which is not documented in the extant Greek medical texts. Shortly before the Arab conquest Byzantine physicians not only revived the quantitative assesments which had existed in older medical embryology, but had been neglected to some extent during the Hellenistic age; they, moreover, supplemented the medical tradition by arithmological notions of Neopythagorean origin which may be due to the general predilection of the time for number mysticism." [12]
It is after Ibn Māsawaih that Hellenistic medicine definitely spreads over the Islamic world. As a result more attention is paid to the physiological aspects of embryogenesis. The points of view of scholars such as Rhazes, Avicenna, ʿAlī b. al-ʿAbbās al-Majūsī are "closer to that of the Hellenistic physicians such as Galen than to the approach of their Arabic predecessors." Thus in the time of the Omayyads and early Abbassids Byzantine influence is rather strong. Later only Hellenistic knowledge filters through into the Islamic world. This is also evident from what Adelmann says in his treatise on the evolution of embryology: [13]
"It was Avicenna who exerted perhaps the greatest influence on anatomy and embryology. His thoroughly Galenic treatment of the formation of the fetus and particularly his notion of the appearance, after the umbilicus has been formed, of three swellings representing theliver, heat and brain, a notion based upon what Galen had said in his De Semine (see Kühn I, 8) was still coloring thought on the subject as late as the middle of the 17th century."

4.3.2. Aspects of Islamic medicine. [14]

Greek knowledge and thought exerted much influence on the Arabs. The ʿulūm al-awā'il (sciences of the antique scholars) were also preponderant on Arabic medicine and natural science. Science for the Arabs was a stable system of formal and material truths that are passed on and that man should accept. There is no room for new thoughts. This has everything to do with respect for the authority of the 'awā'il. There is

no criticism of sources or scholars who passed on science. Contradictions in science were no problem: there are no fixed criteria, no experiments, no hypotheses, no inductive methods. Parallels were drawn though between the macrocosm and microcosm. In the Tuḥfat al-ʿajā'ib wa-ṭurfat al-ġarā'ib, the so-called Pseudo Ibn al-Athīr for example there is the parallel of man bearing the same proportion to the external world as the microcosm to the macrocosm. In it man is also compared to the seasons.[15] Qazwīnī compares man's body to a town.[16] Analogy and speculation were made use of instead of natural laws. Analogy was applied and thus many mistakes were made.

Materials were said to have khawāss, special occult qualities, causing special effects and used in medical treatment. One should bear in mind that astrology, magic and alchemy were regular sciences for the Arabs. Rhazes and al-Bīrūnī payed much attention to magic. Nowadays they are being looked upon as non-sciences but to the Arabic mind they certainly were regular sciences. Experiments and observations were scarcely done by the Arabs. Thus medical science remained confined to books as a rule. Not many new discoveries were made and little new ideas and concepts were developed: the Greeks remained authoritive on the whole, particularly Galen.
Ullmann states [17] that we should not blame the Arabs for just passing on science without adding to it (a formidable contribution nevertheless). The essence of their perpetration of science was to accept, compile and pass on. The question of research was hardly raised.
We might add to this that in dogmatics and religious law a stable system was build 2-300 years after the Prophet Mohammed's death. This system was created notably by analogy, and when it was finished, no one was allowed to change or depart from it. It was fixed immutably for eternity. Its authority could not be doubted. This way of thinking certainly influenced the Arabs' handling of the antique heritage.

4.4. Discussion.

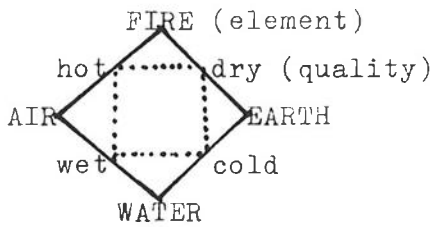
4.4.1. The Scala Naturae, the souls and the four elements.

The division of the animate beings, the kā'ināt, reveals a kind of Scala Naturae. Here we find a definite Aristotelian influence. Aristotle tells us that 'Nature passes from inanimate objects to animate beings in an unbroken sequence, interpolating between them beings which live and yet are not animals that scarcely any difference seems to exist between two neighbouring groups owing to their close

proximity.[18] Qazwīnī divides the (animate) beings according to certain faculties. This we find back in Aristotle as well: He tells us that "the term life is used in various senses, and, if life is present in but a single one of these senses, we speak of a thing as living. Thus there is intellect, sensation, motion from one place to another and rest, the motion being related to nutrition, and further,(there are the processes of) decay and growth." Hence it is that even "plants are supposed to have life, for they have within themselves a faculty and principle whereby they grow and decay.[19] Plants have a so-called vegetative soul (ψῡχή)."It is then in virtue of this principle that all living things live, whether they are animals or plants. But it is sensation which primarily constitutes the animal".[20] Animals have an animal soul, the sensitive soul. Man has moreover a rational,intellectual soul.[21]
This is all in agreement with Qazwīnī's introduction to the animate beings. According to Aristotle minerals do not have any faculty of life, they are'lifeless'[22]objects. In Qazwīnī no faculty is attributed to them either. Further plants are described as having the faculty of growth only. Animals have the faculties of sensation and motion. For Aristotle the principle of motion is not as important as the principle of sensation. "For, provided they have sensation, even those creations that are devoid of movement are called animals. " [23]
Man is classes together with the animals in Qazwīnī, but he gets a higher position because he has gor the intellectual faculty. Aristotle, too, attributes to him this rational psyche.
Still, there is an important difference. Qazwīnī says that man's intellectual soul (an-nafs annāṭiqa) is a gift from God.[24]For Aristotle the notion soul is the same as the notion nature.[25] Nature took care of the Scala Naturea. Things live in as far as they have a soul or have none (ἔμψῡχα or ἄψῡχα).[26] This soul, or life principle, or principle of nature is an internal principle whereas in Qazwīnī it is an external principle. God creates things and those things exist outside him. Remember the description of makhlūqāt: "we understand by makhlūq everything that is existent outside God".[27]
Important to mention is that Qazwīnī tells us that the highest rank of man can look into the world of spirits. This clearly points to a neoplatonic influence. Also the division into celestial things and earthly things points to that. Notions of this nature are not alien to Aristotle. Thus it need not surprise us that we find these ideas connected with Aristotle in Qazwīnī.

Returning now to the Scala Naturae we see that Qazwīnī divides jinns and animals with strange forms as well among the hayawān. In Aristotle they cannot be found. This is not at all illogical as jinns were regarded as 'normal' beings as well and thus should have their place among them as well. It should be remembered that these creatures were a reality for the Arabs, whereas Aristotle does not pay attention to them. (see chapter 4.3.2.)

In short: Aristotle's idea was that nature induced the genesis of beings in degrees: having a soul or not having a soul. Of what has a soul the lowest degree is the vegetative soul, the next the animal soul and the highest the rational soul. These souls represent faculties of life, growth, sensation, nutrition, intellect etc. The idea of the three souls was adapted by Galen as well. He made it one of the basic principles of his philosophy.[29] These three souls we find back in Qazwīnī except for the vegetative soul but as the last one has everything to do with nutrition etc. we find him back in a way in the liver in our text. With respect to the things, ἔμψυχα or ἄψυχα , every one of them is composed of the so-calle elements (στοιχεῖα), each of which is compounded from two of the four primary qualities (δύνᾰμεις) In survey:



The notion of the four elements is not from Aristotle himself. Empedocles (c. 500 - c. 430 b.c.) and Pythagoras (c. 580 - c. 490 b.c.) already formulated it, but Aristotle developed the doctrine [30] and Galen adopted it completely too.[31] We find these four elements in Qazwīnī as well: the body consists of a joining of these four elements (see: the introduction of the anatomy), the ʿaṣarāt, the juices from which the kā'ināt are build ; air is not mentioned specifically.[32]

If we follow the anatomical line we see in Qazwīnī that the body consists of uniform and non-uniform parts. This division can be found in Aristotle as well where the uniform parts consist of the four elements, the raw materials of the world. [35]

4.4.2. God and Nature.

On the notion 'nature' Aristotle says that 'Nature does nothing in vain."[34] The operations of Nature are dictated by a final cause, intended to realize some desirable end." [35] Galen comes very close to this by saying that the usefulness (of the parts of the body) is the same as utility, fitness for some desirable purpose or valuable end. [36] Both say in fact that everything is constructed in the most perfect way; the least change in any detail would be for the worse.[37] This we find in Qazwīnī as well: the designing power created the penis on the top of the diaphragma and not on one of the sides of the body as limbs on the sides of the body always grow in symmetrical pairs. Nature (the designing power) knows what it is about . In Qazwīnī God has a great creative role. As has been mentioned before, nature has an internal significance with Aristotle. When we look more closely at the notion 'nature' (ἡ φύσις) in Galen's De usu partium it is a living principle within the organism in the first instance, like with Aristotle. At other times, however, and those prevail, nature seems something indwelling that controls the organism, or even something apart from it that formed it and shaped it in the beginning. She, nature, assumes a creative role, she becomes in fact, Plato's Demiurge to be praised and worshipped as God.[38] Nature actually has become God. And this is exactly what we frequently find in Qazwīnī, God the creator, the foresight of God, the wisdom of God and less frequently nature is creator of for instance the eyes of the blind mole or it is the designing power creating the penis in its regular place. All are variants of Galen's Nature/God. Thus God in Qazwīnī is much more closely connected with Galen's concept of Nature and -at a farther- remove with the Aristotelian concept of soul. In chapter 4.2.1. (the divine soul) we mentioned God's role in the preservation of the species: procreation is the means to preservation. Galen deemed this role to Nature: Nature has given instruments for conception as to continue the race because the work of her hands is not immortal.[39] Here again we find a similarity between Qazwīnī and Galen.

4.4.3. Astrology.

In our text we detected an astrological factor as well (chapter 4.2.2.) The astrological factor is not new. We may refer to ʿAlī b. ʿAbbās al-Maǧūsī who mentions the same order of celestial bodies to influence the fetus consecutively in each of the nine months.[40] The latter, however describes the nature of these influences, Saturn, for example, brings mischief. In the eighth month the child is in a state of oppression.

This we find in our text as well but it is not mentioned as being connected with the influence of Saturn specifically. The notion that the child is ill in its eighth month is of Hippocratic origin. He, however, puts the blame on the child's trouble to get out in the seventh month. If it fails to do so, it gets ill and tired in its eighth month. al-Majūsī combined the astrological with the Hippocratic and Qazwīnī did so as well.

The Rasā'il of the Ikhwān al-safā' describe these astrological developments of the fetus also, but in a much broader context.[41] An example of this is that it says that it is the sun that blows the spirit of life (ruḥ al-ḥayā) in the fetus in the fourth month and with it therefore the animal spirit. Qazwīnī mentions this also but he lets the angel blow the spirit into the fetus. The letter says that the sun is the 'chief' of the stars and the seat of the spirit of the world (rūḥ al-ālam).[42] Its celestial position is like the heart's in the body. This obviously refers to the notion of the innate heat in the heart, so essential for Hippocrates and Aristotle.(see chapter 4.4.5.)

Further the description in our text of the fetus in its ninth month is exactly like the one in the Rasā'il:[43]

'istawlat ʿalayhi quwā rūḥāniyyātihi wa-ʿtadala al-mizāj wa-qawiyat rūḥ al-ḥayā , ẓaharat 'afʿāl an-nafs al-ḥayawāniyya fī l-jasad...

It is obvious that the letters of the Ikhwān al-safā' influenced the astrological aspect of our embryology. In the works of Hippocrates, Galen end Aristotle we consulted we did not find such information but astrology played a role in their ideas as well.[44]

4.4.4. Powers.

Considering the role of the powers (chapter 4.2.3.) we refer to Galen. He attributed to the threefold division of the soul (the rational, animal and natural soul) powers: a mental faculty, a vital faculty and a natural faculty. The first two can be found in our text. The third is missing but this does not seem to be a problem. It seems probable that it exists too: the liver has natural pneuma according to Qazwīnī and natural powers may be attributed to it.

Galen expamded the number of powers: according to him, all parts of the body have powers: attractive, retentive and expulsive powers,[45] all mentioned in our text numerous times. As for example the uterus, which has the power of attracting the male sperm; next it retains the fetus within the womb; moreover there is the expulsive faculty which operates at the time of birth. Galen invented many more powers, found in our text

as well. But this great number of powers got a ridiculous character and Galen knew that:

"As long as we are ignorant of the true essence of the cause which is operating, we call it a 'faculty'. Thus we say that there exists in the veins a blood-making faculty, as there exists a digestive faculty in the stomach, a pulsatile faculty in the heart, and in each of the other parts (of the body) a special faculty corresponding to the function or activity of that part." [46] The sometimes vague explanatory aspect of these numerous faculties can be found in Qazwīnī as well.

4.4.5. Heat.

Heat, which plays such a considerable role in our text, is important for the Ancients as well. For Hippocrates heat is a decisive factor for a living being to live or not to live.[47] In its greatest quantity it is found in the heart where innate heat has its seat. Aristotle, too, supposes that life departs when the heart loses its heat.[48] Galen reflects Hippocrates' and Aristotle's ideas on innate heat.[49] Heat is in the sperm, and the heart is the heat's centre. Heat has a supporting and protecting role for matter. The idea that the heart is the well of life, which we read in Qazwīnī as well can evidently be traced to these sources.

The description of the procreative organs of male and female are based on the principle of heat. This same notion can be found in Galen[50] who says that due to 'the difference in temperature a difference of growth exists: the male's procreative organs protude whereas the female's are left inward. This, he says makes coitus possible and space (the womb) is created for the fetus. Galen also makes the same comparison between the male and the female procreative organs; that they are infact two of a kind and that if the male's would lie inward they would occupy the same place as the female's.[50] Ibn Sīnā presents the same description without however giving the argument of heat as its cause.[51]

The example of the mole's eye in our text following this piece is very old. It can be found in Aristotle already [52] and Galen quotes it as well.[53]

4.4.6. Male and female sperm, menstrual blood and the contribution of the male and the female to the generation of the embryo.

male sperm:

It is very evident from Qazwīnī's text that his hypothesis about the origin of the male sperm has been influenced by Aristotle. He assumed

that the sperm is concocted from blood.[54] A minor Hippocratic influence may be detected when our text says that this last residue goes to the testicles via the spine. And the spine lies on the route of the Hippocratic way of the sperm: from the brain, its source to the spine.[55] Ibn Sīnā as well takes a position in favour of the sperm as a left-over of the last digestion.[56] It is interesting that in 3.44.23-24 our text says that the blood is converted into the nature of sperm in the testicles and in 3.57.9-10 it ascribes this function to the so-called sperm-vessels while ascribing a creative power to the testicles. The last description is of Galenic origin who writes exactly the same.[57] The first description is rather obscure. It can not be traced. The testicles were generally considered as being a resevoir for the sperm (Hippocrates and Galen).[58] Aristotle holds that they are weights to keep the seminal passages tight.[58]

the female sperm and the male and female contribution:

Coming to the nature of the female sperm we touch the basic problem of the contribution of the female in procreation. The fact that the male parent contributes to it seems to be without any doubt with the Greek thinkers. But what about the woman's role? We have seen in our text that the female contributes to the conception by means of her menstrual blood.

The Aristotelian idea that the male does not contribute materially but only pneuma through movement and change, transported however by the seminal fluid, cannot be found in Qazwīnī. There, pneuma plays also a large role in the male's sperm. It assists in the erection and the linking of the drop in the womb. But in Qazwīnī the male contribution is also of a material nature where pneuma assists but it is not the only factor. In Qazwīnī creative power is also attributed to the female sperm in the testicles. This idea is not of Aristotelian origin. Aristotle deems women to contribute materially to the embryo and does not assign her a genetic part, nó forming principle.[60] Galen however says that male ánd female contribute material, formal and motive force to the fetus,[61] a creative power, thus opposing Aristotle (This way is read in Qazwīnī most times). In Qazwīnī both sperms have a form-giving principle. That is in accordance with Galen. If we look at Ibn Sīnā, he too opposes the idea that the female does not contribute genetic matter at all. On the whole, he follows Galen without, however, giving a clear idea of the female's role.[62]

menstrual blood:

The notion of conception through the male sperm and menstrual blood is of Aristotlian origin. He presupposes the mixture of male sperm (pneuma) and the menstrual fluid,[63] an idea we come across in Qazwīnī as well, but not as much as the conception through two sperms.

4.4.7. What causes the fetus to become male or female.

In considering the causes for the fetus to become male or female we make use of the survey on it on page 83.

We will start with the third cause. The idea that the sperm from the right testicle generates males stems from the idea that the right testicle's sperm generates males and the left females.[64] This theory was set up by the pre-Aristotelian writers and was often related to the idea that the right side of the womb, which was regarded as being hot, produces males and the left side, assumed to be colder, females. It was the Ancient writer's general view that males were hot and dry and females cold and wet. (In practise the quality of cold however does not seem to accord with the real nature of women). The right side of the womb and the right testicle derive blood directly from aorta and kidneys, coming from the heart which is the seat of the innate heat: thus they are warmer. These ideas about left-right can be found in the Hippocratic writings and in Empedocles.[65] Aristotle rejected the left-right theory[66] and Galen revived it,[67] combining it strongly with the heat-cold factor. Aristotle argues that male and female fetuses are found in all parts (left and right) of the womb. Aristotle was a mere supporter of the idea that sex is determined by the condition of the seminal fluids. Democritus already developed the idea that a mixture of strong male and female sperm generates males whereas the opposite of it generates females.[68] Aristotle continues this and says that both have 'powers' in them. The stronger one determines the sex and the resemblance to one of the parents. The pneuma is the basis of these powers.[69] Thus he goes beyond his own idea that the female does not contribute genetically. And this takes us to point 2 of our survey (p. 83) although heat plays a part as well, probably a Galenic influence.

Point 1 could not be traced. Probably it is an extension of the idea that heat and cold assist at the moment of conception in the future sex of the child. It may be a variant of the theory of the strongest sperm but then speaking in terms of cold and heat. The Hippocratic author of 'on seed' explained the existance of hermaphrodites as a result of both sperms being equally strong. This would oppose our text which says that

in that case twins are begotten. We cannot trace this too, then. Further we should be wrong then in supposing that the position of the 'drop' in the middle of the womb causes the formation of hermaphrodites

The problematic points 3a) and 4b) must be wrong. They contradict all theories. Ideas of this kind namely, that the condition of a man influences the future sex of the child, can still be found in the twentieth century. One sex instruction book (1922) says for example that if the man is older than the woman females are conceived as a rule.[70]

4.4.8. What makes the child resemble one of its parents.

In answering the question of resemblance to one of the parents we find only one reference in Qazwīnī. (3.53.20-54.2) The idea that the shaping power in the sperm is intent on the shaping of something that is similar to the thing it separated itself from, contains a so-called pan-genetic notion: the semen comes from the entire body. This is a Hippocratic notion.[71] Aristotle rejects this [72] as does Ibn Sīnā later.[73] The seed, Aristotle says, does not come from the whole animal but aims at producing a new being. Not ἀπο παντος but πρός ἅπαν. The cause of resemblance lies in the idea that the matter (=female sperm) may accept more or less of the activity of the moving cause present in the sperm (= the male's) This moving cause may be detected in Qazwīnī's shaping power in the sperm, but Qazwīnī deems present this power in the female's sperm as well, completely in contradiction with Aristotle. The pangenetic notion in this issue seems mere predominant than Aristotle's ideas.

4.4.9. The formation of the fetus. On pneuma.

The first description of the first developments of the fetus are of a Galenic origin. The formation of the ball and of the first membrane (the placenta) are exactly similar.[74] The description of the membranes (Chapter III) is of a Galenic origin as well. He describes exactly the same anatomy and fuctions. He also says that the first membrane is formed after 6 days. A notion similar to our text.[75] The menstrual blood generating flesh contains the Aristotelian principle that the female contributes matter to the fetus. (see above) On pneuma: The grease of the sperm is explained as the mixed pneuma. From this grease the heart, liver and brains are formed. This can be found in Galen as well.[76] They are the sources of the three pneumata the soul-like, animal and natural. The liver is the most important

contributor for Galen,[77] our text however says that the heart is the well of life, which is rather a Aristotelian idea[78] adopted by Ibn Sīnā, who says that the heart is the first organ to be created. It is the first and last living organ.[79]

Galen, observing the similarity between marrow, nerve, brain and sperm, which was noticed and used by the Hippocratic writers and by Plato, says that the male sperm provides the material for the development of the nerves and of the walls of arteries and veins.[80] This we find in the third description of the genesis: the powers in the nutfa form membranes and veins.

The idea that the fetus is fed by the menstrual blood can be read in Hippocrates as well as in Galen.[81] Galen also mentions that the fetus is fed by pneuma.[82] We read this in Ibn Sīnā as well.[83] Later on in pregnancy this menstrual blood is converted into milk. Hippocrates does not mention the blood as the source material of the milk. Aristotle however does and so does Galen.

Hippocrates states that the formation of the fetus is completed in 32 days if it is a male and in 42 days if it is a female. We find this in our text as well. The first description says it is completed in minimally 35 and maximally 45 days. In the third description it is in 30 days that everything is completed. In these descriptions more numbers are mentioned. And here we do still find an influence so strongly present in Ibn Māsawaih, who spent the bulk of his embryology to the number symbolism of Pythagoras.[84] This is not the case in Qazwīnī but we find traces of it. The second description aims to give a Koranic description of the embryology. This we find back in the Tuhfat al-ʿajā'ib wa-turfat al-ġarā'ib, the so-called Pseudo Ibn al-Athīr, which has a kind of embryology as well:[85] it quotes the same text from the Koran[86] but it gives an explanation of the change of tīn (clay) into sperm.[87] It says that possibly people eat this tīn and that it is changed into blood within the body, which is then transformed into sperm . This work bases itself much more on Koranic texts than Qazwīnī. Although this Tuhfa quotes the Ancients[88] like Plato, Pythagoras, Aristotle and Galen, many times, it does not incorporate them. Its Introduction to man is exactly the same as Qazwīnī's.[89] An indication that they are rather close to each other (see chapter 1.2.4.).

4.5. Conclusions.

In considering our conclusions on Qazwīnī's embryology we can not be too critical of the author. He himself has said that he was inclined to preserve the beautiful, wonderful things of nature. Therefore we may expect his writings not to be of a very profound, scientific nature. If we look at his embryology we already notice this by the frequent quotations he makes. Chapter II, III, VI, VII, VIII and the chapter on the procreative organs are all written on the authority of others: they say, they assert, this belongs to what is right with the masters of anatomy etcetera.

Probably due to Qazwīnī's not too scientific attitude, he has confronted us with difficult problems. A good example of this is his use of the words nutfa, many and zarc all meaning 'sperm' and the actual development of a nutfa (sperm) into a nutfa (an embryo). If we read Hippocrates' Kitāb al-Ajinna, the many of male and female change into a janīn immediately during conception (Hippocrates 39.1-3) and Ibn Sīnā has it as well (401).

In analysing Qazwīnī's text, matters concerning spirit, soul and pneumata, the male and female sperm and the process of the genesis of man got very complicated. Really chaotic is the account of the formation of the fetus, of which there are four descriptions. In the divine, astrological and power factors and in the description of the procreative organs he follows rather logical lines though.

In discussing the text my first thought was to concentrate on Hippocrates and Galen , masters of anatomy with the Arabs. But while tracing the sources I was confronted with Aristotle many times, much more than I expected. His name appeared in connection with the Scala Naturae, in the nature of the sperm, the contribution of male and female and in many more places. Hippocrates however appeared less than I expected, whereas Galen got the position I expected. He appears almost constantly in the text. It is interesting that only in astrology Arabic sources could be detected that were mixed only a little with Hippocrates' ideas. But on the whole the Ancient Greeks have been the sources for our text. Nothing really new was added to it and that makes it fit with the Arabic, scientific tradition as described in chapter 4.3.2. Qazwīnī also made a good contribution in passing on science without adding to it, but this is inherent in the character of the Cosmography: it is a compilation. In Islam's own medical history Qazwīnī fits as well. The work of Ibn Māsawaih is rooted in the Pythagorean number mysticism

with less information on the embryology. Weisser says in her article on Ibn Māsawaih that later on in time more attention is paid to the physiological aspects of embryo-genesis: Rhazes, Avicenna and others are examples of such people. Hellenistic medicines defenitely establishes itself in the science of medicine with the Arabs. Qazwīnī fits into this development. Traces of the science of numbers can be found in him but they are rather vague. Much more attention is paid to physiology. And as Galen influenced Avicenna very much, so he influences Qazwīnī. Hippocrates, who entered the Islamic world together with Galen, also enters Qazwīnī most times with Galen.

Each time we quoted Ibn Sīnā in Part B, Qazwīnī appears to 'share' his point of view. Only on the point of resemblance he differs.

Concluding, we may say that Qazwīnī's embryology fits in with the character of his Cosmography and with the medical history of the Arabs. It is written not too critically but is nevertheless of a rather good level: it can be chaotic but consistent lines can be detected in it too. Qazwīnī's importance lies in the contribution he paid in passing on a considerable quantity of medical knowledge. His work was widely spread and so was the embrology in it.

WORKS CITED 4

1. Adelmann, H.B. Marcello Malpighi and the evolution of embryology. I - V (Ithaca, New York 1960)

2. Alberts, J.E. Het ontstaan, de Ontwikkeling en de Geboorte van den Mensch (Amsterdam, no year)

3. ʿAlī b. Rabbān al-Tabarī Firdaws al-Ḥikma or Paradise of Wisdom M.Z.Siddiqi ed. (Berlin 1928)

4. ʿArib ibn Saʿīd al-Kātib al-Qurṭubī Kitāb Khalq al-Janīn wa-Tadbīr al-Ḥabālā wa-l-Mawlūdīn, Publications de la faculté mixte de medicine et de pharmacie d'Alger III, trans. and ed. Henri Jahier and Noureddine Abdelkader (Alger 1956)

5. Ethé, H. Zakarija ben Muhammed ben Mahmūd el-Kazwīnī's Kosmographie, nach der Wüstenfeldsche Textausgabe, trans. H. Ethé (Leipzig 1868)

6. Galen 'On the usefulness of the parts of the body' I II, trans. M.T. May (Ithaca, New York 1968)

7. Hippocrates Kitāb al-jinna li-buqrāt in: Arabic technical and scientific texts VII, trans. ed. Lyons, M.C. and Mattock, J.N. (Pembroke College, Cambridge 1978)

8. Hippocrates Ueber Achtmonatskinder, über das Siebenmonatskind (unecht) trans. ed. Hermann Grensemann (Akademie-Verlag Berlin 1968).

9. Ibn Sīnā al-Shifā': at-tabīʿiyyāt 8, al-ḥayawān Abd al-Halim Muntasir Said Zayid ed. (Cairo 1390 H/1970 AD)

10. al-Majūsī Kitāb kāmil aṣ-ṣināʿa at-tibbiyya (al-kitāb al-Malakī) li-ʿAlī b. al-ʿAbbās al-Majūsī I, II Būlūq 1924

11. Preus, A. 'Galen's Criticism of Aristotle's Conception Theory' in: Journal of the History of Biology X, 1 Everett Mendelsohn, ed. (Harvard University spring 1977)65-85

12. Ps.ibn al-Athīr Tuhfat al-ʿajā'ib wa-turfat al-ġarā'ib al-mansūb ilā l-Mubārak bn al-athīr al-jazarī microfilms Geography no. 1344ṭ and 499 (Dār al-Kutub Caïro no year)

13. al-Qazwīnī Kitāb ʿağā'ib al-maḫlūqāt (Microfilm A 987 University of Leiden 1984. Origin: Munich, Bayern State Library Catalogue Aumer no. 464 p. 192)

14. Rasā'il Ikhwān aṣ-ṣafā' wa-khalāṣat al-wafā' I-IV Khayr al-Dīn az-Ẓirkilī, ed. (Cairo 1928)

15. Singer, Ch. 'Greek biology & Greek medicine' in: Chapters in the history of science, I Singer, Ch. ed. (Oxford 1922)

16. Taeschner, F. Die Psychologie Qazwīnis (diss. University of Kiel) (Tübingen 1912)

17. Ullmann, M. Die Medizin im Islam in: Handbuch der Orientalistik, erste Abteilung, Ergänzungsbans VI, 1 Abschnitt (Leiden/Köln 1970)

18. Ullmann,M. 'Islamic medicine' in: Islamic surveys (Edinburgh 1978)

19. Weisser, U. 'The embryology of Yuḥannā ibn Māsawaih' in: The Journal for the History of Arabic Science 4i (1980) 9-22

20. Wüstenfeld, F. Zakariya Ben Muhammed Ben Mahmud el-Cazwīnī's Kosmographie, die Wunder der Schöpfung, I Wüstenfeld, F. ed. (Göttingen 1849)

NOTES CHAPTER 4

1) For the translation of the introduction of the Kā'ināt we made use of Hermann Ethé's translation (5)
2) M fol. 98b - 99a
3) M fol. 144a,b
4) M fol. 143b - 144a
5) On the description of man we made use of Taeschner's translation (16)
6) Sura 17:72
7) For all works cited here see bibliography.
8) For this chapter we made use of Ullmann's Die Medizin im Islam (17)
9) see translation p.6
10) Ps. Ibn al-Athīr fol. 495
11) Weisser see no. 19 bibliography
12) Weisser 21
13) Adellmann II 750-51
14) For this chapter we made use of Ullmann's Die Medizin im Islam (17) (1-25)
15) Ps. Ibn al-Athīr fol.507
16) Wüstenfeld's Qazwīnī-edition p. 354-5
17) Ullmann; Islamic medicine p. 22-23
18) Ar. De part. an iv 5; 681^{a} 10 / Singer 31
19) Ar. De anima ii I, ii / Singer 40
20) Ar. De anima ii 2 ii; 413^{a} 22 / Singer 41
21) Singer 41
22) Ar. Hist. An. viii I: 588^{b} 4 / Singer 30
23) Ar. De Anima ii 2, ii; 413^{a} 22 / Singer 41
24) M fol. 144
25) Ar. De Part. an. i I; 641^{a} 7 / Singer 29
26) Singer 40
27) M fol. 5b.21
28) Singer 38-9
29) Galen De usu part. IV. 13. (plus note 66 May) / May 45
30) Singer 39
31) May 44
32) M fol. 144a
33) Ar. De Part. An. II. 2ff / Preuss 74-5
34) May 10
35) Ar. De Part. An. i I; 641^{b} 12 / Singer 28
36) Galen De usu Part. XVII. 1
37) May 9-10
38) May 10
39) Galen De usu part XIV 1,2.
40) al-Majūsī, al-Malakī I 120-51
40a) See Hipp. (8) Über Achtmonatskinder 2
41) Ikhwān al-safā', masqat an-nutfa, 4th letter ch. I-VI
42) " 358
43) " 361
44) Ullmann Die Medizin im Islam 255
45) May 49
46) Galen De naturalibus facultatibus I, 4 / May 49
47) Hipp. De carnibus 2 (Littré VIII 584, 85) May 50 / May 51
48) Ar. De juventute et senetute, de vita et morte cop.4 469^{b} 6-20
49) May 52-3
50) Galen De usu part. XIV 6 (628-9)
51) Ibn Sīnā al-Shifā' 388-9
52) Ar. Hist. an. I, 9, 491 b 27-34

53) Galen De usu part. XIV. 6 (629)
54) Preuss 78
55) Hipp. Kitāb al-ajinna 1. 22-27
56) Ibn Sīnā al-Shifā' 394 and 396
57) Galen De usu part. XIV. 10 (641-2)
58) Preus 81
59) May 58
60) Ar. De Gen. An. I, 20, 729a9-33
61) May 57
62) Ibn Sīnā al-Shifā' 392
63) Preus 78 / May 57 / Ar. De ge. an. I, 20 729aq-33
64) Preus 66
65) Preus 68-9
66) Preus 76
67) Galen De usu part. XIV 7
68) Preus 73
69) Ar. Gen. Ar. IV 3 / Preus 79
70) Alberts Het ontstaan 72
71) Preus 66
72) Ar. Gen. an. I. 17 / Preus 74
73) Ibn Sīnā al-Shifā'394
74) May 58
75) Galen De usu part, XV 4, 5 (661-6)
76) Galen " XV 6 (669)
77) May 58
78) Ar. De Gen. An. ii 1 and 4 / Singer 35
79) Ibn Sīnā al-Shifā' 401, 421
80) Preus 83
81) Hipp. Kitāb al-ajinna 12; Galen De usu part. XV 5 (665)
82) Galen, De usu part. XV 5 (665)
83) Ibn Sīnā al-Shifā' 401, 421
84) see article Weisser (19)
85) Ps. Ibn al-Athīr fol. 487-510
86) " fol. 495
87) " fol. 495
88) " fol. 498, 509
89) " fol. 487-8