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SCHOOL OF ORIENTAL AND AFRICAN STUDIES

Contributions to the History of the Islamic Mint in the middle ages.

Thesis submitted for the Degree of Ph.D.

by

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Contributions to the History of the Islamic Mint in the Middle Ages.

This thesis is the first attempt of its kind to contribute to the history of the Cairo mint, a very important economic institution in the Ayyūbid state organisation in the 13th century A.D.

The detailed discussion of the subject is primarily based on entirely new material, drawn from an unpublished and hardly known Arabic manuscript, entitled 'Secrets of the Mint' and composed by Mansūr ibn Ba'ra. The author of the thesis submitted the extremely difficult and corrupted text to a critical analysis which revealed that the treatise of ibn Ba'ra was written between A.D.1218 - 1225 (A.H.615 - 622). The interpretation of the invaluable material, contained in the manuscript, permitted the author to investigate all aspects of the mint of Cairo. Its administrative significance, its system of control, its internal organisation, its technical problems, finally its monetary issues and methods of production.

The discussion is presented in the light of contemporary historical background, based both on textual and numismatic source material. It is preceded by an outline of the minting policy of the Arab Caliphate and a more detailed summary of the history of mints in the Muslim Egypt down to the reign of al-Kāmil (A.D.1218 - 38). The author of the thesis also challenges present methods of presentation of numismatic catalogues, which, in his opinion, do not fully answer the requirements of modern historical research. A full copy of the manuscript of ibn Ba'ra, with its English paraphrase complete the scope of the thesis.

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INTRODUCTION

It is a common characteristic of every student recapitulating the results of his first research to overrate the significance of his achievement. But even at the risk of being accused of having succumbed to this danger I cannot refrain from stating that the conclusions reached at the end of my research have by far outgrown my first expectations.

When I decided to embark upon the subject of Islamic mints I intended to contribute to the knowledge of the history of Medieval Islamic institutions, for, as Sauvaget points out, 'l'hôtel de la monnaie étant inséparable de l'hôtel du gouvernement, les ateliers monétaires sont aussi des centres administratifs.' [1] I also wanted to investigate the methods of production of coins, the limited knowledge of which results from the fact that, to use the words of Miles, 'Arab writers tell us virtually nothing about the operation of the mint and the technique of coining.' [2]

In the course of my research, however, I realised that the study of Islamic mints is also very relevant from the point of view of Medieval Islamic trade activities. The

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1) J. Sauvaget, Introduction à l'Histoire de l'Orient Musulman, Paris (1946), p.51.

2) G.C. Miles, The Coinage of the Umayyads of Spain, New York (1950), i. p.98.

mints were certainly not established to issue coins with the purpose of satisfying the vanity of Eastern princes,as claimed by Lane-Poole [1],but to meet the requirements of the economic situation.Thus by tracing the distribution of mints,as well as their monetary issues,we may be able to obtain valuable informations about contemporary trade.As a typical example of this kind of approach to the subject may serve the case of the Fāṭimid caliph al-Āmir.Upon the loss of his very active mint in Tyre,to the benefit of the Crusaders,al-Āmir saw himself compelled to set up a new mint in Qūṣ,which move was certainly directed by the necessity of maintaining the supply of coins for the needs of the Egyptian trade.

Another important conclusion was the realisation that a minute scrutiny of technological aspects of the production of coins,and above all of their alloys,is the key to the understanding of the nature of Medieval Islamic monetary developments,an essential prerequisite to the study of Islamic economic history.

Textual sources bearing upon the subject of Islamic mints are very limited.There are two published Oriental works with chapters entirely devoted to the problems of mints.Those contained in 'The Ain i Akbari' deal with 16 c.

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1) S.Lane-Poole,Fasti Arabici,NC,3rd ser.,(1885),p.154.

mint of the Moghul sultan Bābar.[1] Those included in 'Tadhkirat al-Mulūk', treat the mint of the Ṣafavids.[2] There exists also the treatise of Haj Lassen (?), in manuscript form, giving the account of 14 c. mint of the Almoravids. A French translation of this treatise by M.Viala has been published in the work of J.D. Brethes.[3] As this translation is not accompanied by any critical notes, or by the Arabic text itself, it must be treated with utmost reserve. In addition to these major sources scattered fragmentary informations can be found in works of various Oriental chroniclers, moralists or authors dealing with administrative problems, such for instance as Ibn Sa'īd, al-Ghazzālī, al-Maqrīzī, al-Qalqashandī or ibn Mammātī.

It is much better with informations concerning Islamic coins. For not only do Oriental texts abound in references concerning various types of coins, but there is even a whole work dedicated to Islamic coins, composed by al-Maqrīzī who based his work on both textual and numismatic material. A task to collect and systematize these various scattered informations was successfully attempted by H.Sauvaire towards

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1) H.Blochman, The Ain i Akbari, Calcutta (1873).
2) V.Minorsky, Tadhkirat al-Mulūk, London (1943).
3) J.D.Brethes, Contributions à l'Histoire du Maroc par les Recherches Numismatiques, Casablanca (1939).

the end of the 20 th century.[1)]

A special place in this discussion on textual sources must be reserved to an entirely new source which constitutes not only the basis but the point of departure in my investigation.The source in question consists of an unpublished and hardly known manuscript of the Library of the King in Egypt, which contains a practical handbook dealing with problems of the Egyptian mint (Kashf al-Asrār al-ʿIlmiya bi dār al-Ḍarb al-misriya),composed by Manṣūr ibn Baʿra. A critical analysis of the contents of this text permits to identify this treaty as having been composed between A.D.1218 - 1225 (A.H.615 - 622),that is to say in the first half of the reign of the Ayyūbid sultan al-Kāmil. Although only a late and extremely corrupted copy of the original text has been discovered so far,it nevertheless offers a considerable amount of invaluable information for the purpose of my research.

Apart from textual sources there is of course immense numismatic material at our disposal.Since Islamic coins usually exhibit the place and date of their issue,a study of this kind of sources has become particularly essential from the point of view of my investigation.Fortunately

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1)H.Sauvaire,Matériaux pour servir à l'histoire de la numismatique et de la métrologie musulmanes,JA (1879 - 1887).

enough various collections of Islamic coins have since long become the subject of elaborate numismatic catalogues,which are the results of ingenious and toilsome critical examination of generations of numismatists.Do these catalogues, however,fully answer the requirements of modern historical research ?

Let us take for instance the problem of Islamic mints. In my opinion the catalogues provide us with source material which remains yet to be analysed from that point of view. Though all catalogues give us the names of mints born by examined coins (in so far as they are readible and understandable),we must not accept the conclusion concerning the origin of a coin relying merely on its mint mark.Thus for example,we cannot accept wholeheartedly the list of Fāṭimid mints as presented by Miles in his 'Fāṭimid Coins'[1], where under the names of Iskandariya Miṣr and Miṣr ,we find a reference to coins dating from A.H. 337 and 341,343,353 respectively,that is to say up to about 20 years before the conquest of Egypt by the Fāṭimids.Either were these coins struck in mints other than those suggested by their mint marks,or the mints which issued these coins did not belong to the Fāṭimids at that time.

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1)G.C.Miles,Fāṭimid Coins, New York (1951),p.50.

And what about the so-called 'unknown dinars' which show neither mint mark nor the name of the sovereign ? This point is especially relevant for the study of minting development in Egypt.It is a well known fact that the Egyptian mint began to issue gold coins at a certain unknown date,which was an innovation of considerable economic significance.Yet we would expect in vain to find an answer concerning the date of this event on the basis of present numismatic catalogues.

Can,however,a satisfactory solution in respect of these two examples be reached at all (apart from some new textual evidence) ? In my opinion this question remains open so long as the available numismatic material has not been exhaustively analysed.The point I bear in mind,that stone which has still been left unturned,is the problem of alloy,of the standard of fineness of Islamic coins,the analysis of which has hitherto been absolutely neglected.I do not pretend to be the first to insist upon the necessity of investigation of the standards of purity of Islamic coins.Thus for example S.Lane-Poole in his'Fasti Arabici'[1] wants the description of coins in the planned Corpus of Muhammadan Numismatics to be provided with indications of the purity of metal.But whereas Lane-Poole insists upon it from the point of view of the conscientious numismatist,whose duty it is to explore coins from every possible angle,I,for my part,try to point out the practical advantages of this approach to nimismatic source material.

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1)S.Lane-Poole,Fasti Arabici,NC 3rd ser.,(1885),p.157.

Thus,by examining the standard of fineness of Egyptian and Maghribi dinars in the first case,and of the 'unknown dinars' in the second case,we may be able to arrive at some interesting conclusions concerning the questions posed above.

But the analysis of the standards of fineness of Islamic coins offers other advantages,bearing upon a problem more important than Islamic mints.Medieval Islamic texts are rich in references to various monetary types,exchange rates and prices of commodities.An understanding of the nature of these various technical data would certainly elucidate many points concerning the principles underlying monetary developments,and contribute in this way to our knowledge of the economic history of Medieval Islam.It is certainly not enough to state,in a discussion on economic problems,that 'l'empire arabe ' was 'bimétalliste,c'est-à-dire réglant sa circulation monétaire sur le dinar,étalon or,et le dirhem,étalon argent!'[1] Nor is it necessary to reject the hypothesis that 'les dinars radhis étaient .... d'un titre inférieur aux dinars mou'izzis 'en raison des scrupules religieux qui prévalaient alors dans ces questions de frappe de monnaie.'[2] Because there were various types of dinars and various types of dirhams,and the

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1)L.Massignon,L'Influence de l'Islam au Moyen Age Sur la Fondation et l'Essor des Banques Juives,Bul.Et.Or.,Damascus (1931),i.p.6.

2)E.Minost,Au Sujet du Traité des Monnaies Musulmanes de Makrizi,BIE (1937),p.52.

difference between these various types depended on the difference of their alloys.The exchange rate was fixed according to the effective quantity of precious metal contained in the coins,that is to say according to the bonitas intrinseca. The manuscript of ibn Baʿra is absolutely explicit about it,and provides even a table showing the exact differences between the alloys of various types of contemporary currency.By analysing the standard of purity of a score of dinars I have confirmed the information of ibn Baʿra.And following the hints contained in the manuscript in question I believe not only to have explained the nature of the Ayyūbid Nuqra and Waraq dirhams,but also ruled out the reliability of al-Maqrīzī in reference to the monetary reform of al-Kāmil.The examination of numismatic source material from this point of view is a conditio sine qua non,which may not only give answer to the question of the Mamelūk coinage,a question posed 18 (eighteen) years ago by prof.Mayer,[1] but also offer a satisfactory basis to attempt a reconstruction of Islamic Medieval monetary system.

It is on the ground of the above arguments that I am of the opinion that the existing numismatic catalogues do not fully answer the requirements of modern historical research.

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1)L.A.Mayer,Some Problems Of Mamlūk Coinage,The Transactions of the International Numismatic Congress,London,June-July, 1936,

The point may be raised how to proceed with such an examination ? Certainly all the more important numismatic collections remain under the care of Keepers,Conservateurs,Custodians, etc.The very title of these experts implies that they are concerned with the preservation of numismatic material. Some time ago the examination of the proportions of the alloy could only be performed by melting down samples of the analysed coin,an idea which would have certainly shocked the world of numismatists.

To be frank,I would not have any scruples in doing it. To me,as a historian,a coin is purely and exclusively a historical source and not the object of some collectioneering mania.Once a source has been fully examined,it does not represent much value to me.Thus once a coin has been deciphered,measured,weighed,photographed,cast etc.,I do not see any reasons why its samples should not be submitted to melting.This process could indeed reveal to us some interesting details of technological nature.

Fortunately,modern science offers us the so-called spectroscopic method,by means of which exact proportions of the alloy can be ascertained without exposing the coin to any danger whatever.In my research I used the method of measuring specific gravities,which enabled me to reach conclusions concerning the degree of purity of the dinars.I was

lucky to find in Dr.Walker a scholar who not only helped me with his advice,but who also allowed me to use the available instruments of the laboratory of the British Museum,which, unfortunately, is not equipped with a spectroscopic apparatus). When,however,I applied to the Bibliothèque Nationale in Paris, asking for an examination of specific gravities of some dirhams of al-Kāmil,I learnt with dismay that the 'Cabinet des Médailles de la Bibliothèque Nationale ' does not possess any laboratory at all,to proceed with such a simple experiment.If this is the situation in one of the most important numismatic centres of the world,what hope is there for a student of Islamic economics to get beyond the Maqrīzī stage!

In addition to this primary source material I consulted a vast amount of bibliographical material dealing both with administrative and technological aspects of the mint.While a full list of source and bibliographical material is given on pages that follow this introduction,the text itself is provided with adnotations referring to the sources of the passages in question.

Although the main part of the thesis deals with various aspects of the mint of al-Kāmil,I have,nevertheless,thought it necessary to precede it with two introductory chapters discussing the minting policy of the Arab Caliphate and the history of Egyptian mints respectively.Finally,to avoid the

mistake of Mr.Brethes (see above p.7) I have provided my thesis with a copy of the manuscript of ibn Ba ra,produced in my own handwriting.Awkward though it is,it permits the reader to use this main source of my thesis in its Arabic form.

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Abbreviations.

Beiträge -Beiträge Zur Geschichte der Naturwissenschaften,Erlangen.

Bul.Et.Or.	-Bulletin D'Études Orientales, Institut Français de Damas.
BIE	-Bulletin de l'Institut d'Égypte, Le Caire.
Cat.	-Catalogue.
l'Égypte Contemporaine	-Revue de la Société Fouad Ier d'Économie Politique, de Statistique et de Législation, Le Caire.
EI	-Encyclopedia of Islam.
Isis	-Internationale Review devoted to the History of Science and Civilisation, ed. G. Sarton, Bruxelles.
JA	-Journal Asiatique.
Mem.Soc.As.Beng.	-Mémoires of the Asiatic Society of Bengal.
MIFAO	-Mémoires publiés par les membres de l'Institut français d'Archéologie Orientale du Caire.
Mq., Shudh., Mayer	-al-Maqrīzī, Shudhūr al-ʿUqūd, ed. L.A. Mayer.
IB	-Manṣūr ibn Baʿra.
NC	-Numismatic Chronicle.
NZ	-Numismatische Zeitschrift.
QDAP	-The Quarterly of the Department of Antiquities in Palestine.
REI	-Revue des Études Islamiques.
RN	-Revue Numismatique, Paris.
RNB	-Revue Numismatique Belge, Bruxelles.
Sauvaire, Matér.	-Matériaux pour servir à l'histoire de la numismatique et de la métrologie musulmanes.
ZDMG	-Zeitschrift der Deutschen Morgenländischen Gesellschaft.

Chapter I

OUTLINE OF THE MINTING POLICY

OF THE CALIPHS

PART ONE

Chapter I. Outline Of The Minting Policy Of The Caliphs

Chapter II. Egyptian Mints

Chapter I

OUTLINE OF THE MINTING POLICY OF THE CALIPHS

In the wealthy and prosperous mercantile community of Mecca, from where the future Arab rulers originated, there were no mints at all. Shapeless gold ingots were used for the internal market.[1] More important transactions were carried out in dinars issued by the Byzantine mints, or in dirhams of Sāsānid provenance.[2] [3] But even Himyarite coins circulated in Mecca on the eve of Islam,[4] a significant fact indicating that the products of mints of the once flourishing kingdoms were held in high esteem long after the collapse of the last of the South Arabian dynasties.

The rapid expansion of the Arabs in the course of the 7 th century established their sway over territories which had hitherto belonged to the Byzantine Empire and to the vanquished Sāsānid dynasty, and whose static administrative organisations possessed well established minting systems.

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1) Balādhurī in Sauvaire, Matér., JA (1879), p.461

2) Mq., Shudh., Mayer, p.2

3) For commercial activities in Mecca, see Lammens, La Mecque à la Veille de l'Hégire, p.221

4) Baladhuri in Sauvaire, Matér., JA (1879), p.463

These systems,however,differed essentially from each other, both in the character of their structure and in their monetary issues.Though lacking in minting tradition of their own,the Arab rulers did not neglect the problem of coinage in organising their empire.This interest on the part of the caliphs caused that the heterogeneous mints of their empire began, within a relatively short period of time,to issue a uniform type of high quality coins.These were soon to become a popular currency of Medieval Europe,and were even occasionally imitated by the mints of some Christian rulers.[1)]

It is the subject of the present chapter to outline the development of the policy of the caliphate towards minting production.Numismatic evidence and textual source material, scarce though the latter is,permit to distinguish certain phases in this development.They are ;

1.The early transition period
2.The pre-reform Umayyad period (A.D.661-690)
3.The post-reform Umayyad period (A.D.690 - 750)
4.The ʿAbbāsid period (A.D.750 till about the end of the 9th c.,when the caliph exercises none but nominal authority over the mints)

1.The early transition period.

It has been generally accepted that the Arabs immediately after their conquest maintained the existing administrative

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1)cf.,Sabatier,Description Générale des Monnaies Byzantines, i.p.90

organisation.This is on the whole true for their attitude towards the inherited mint systems.[1] As,however,the Byzantine minting policy differed from that prevailing in the Sāsānid realm,it is necessary to discuss the policy of the Arabs in the two different areas separately.

a.Byzantine provinces.

The chief characteristic of the Byzantine minting production was its centralisation.The issuing of gold coins,the official currency of the Byzantine Empire,was restricted to the mints of Constantinople,Carthage and Ravenna.[2] The production of copper coins destined for small local circulation was limited to main provincial centres.The reform of Theodosius II (in A.D.393) seems to have put an end to the rights of private individuals to manufacture copper coins[3]. According to numismatic evidence there were only two mints operating in Syria and Egypt during the reign of Heraclius (A.D. 610 - 641).These were Antioch[4] and Alexandria[5].

Both Egypt and Syria constituted two prosperous provinces

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1)cf.Walker,Cat.of the Arab-Sassanian Coins,p.c.

2)cf.Wroth,Cat.of the Imperial Byzantine Coins in the B.M.i.civ

3)Sabatier,Description Générale des Monnaies Byzantines,i.67.

4)Wroth,Cat.of the Imperial Byzantine Coins in the B.M.i.223

5)ibid.,i.227

of the Byzantine Empire.[1] Egypt, because of her production of corn and papyri, and her commercial activity, African gold being one of its important items. Syria, because of her silk production and because of the advantageous geographical situation, enabling this 'pays éponge', as some call her, to draw enormous profits from the transit trade. The Persian invasion (A.D.614 - 28) followed by the Byzantine reconquest and the final establishment of the régime of the Arabs, all these factors must have produced a considerable reduction in the large-scale trade operations. The wealth accumulated during the long centuries of the 'Pax Romana' formed, however, a solid foundation to carry on internal economic activities, which necessitated supplying the home market with new issues of copper coins. Indeed numismatic evidence[2] shows that the production of copper coins of the Byzantine type was not interrupted by the new rulers. The very nature of copper coins required neither particular skill nor any state control of their standard. As this type of coin with imperial effigy was familiar to the Arabs, it seems quite natural that the existing local mints went on producing the traditional type, unopposed either by the local military governors or by the distant authority of the caliph.

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1) for economic importance of Egypt and Syria see Heyd, Histoire du Commerce du Levant, i. pp. 19-24

2) Stickel, Älteste Muhammedanische Münzen bis zur Münzreform Abdulmelik's, p. 14

Not that these authorities were absolutely disinterested in the existing mint centres.It was in Syria where,under the new régime,the new development began.To judge by the numismatic evidence the old and once flourishing mint of Antioch ceased its operations under the reign of Heraclius (last available copper coin from that mint dates from A.D.616 - 7)[1].Under Arab régime there appeared several mints instead of the Antiochean one.In view of the lack of documentation any explanation of this phenomenon remains in the sphere of hypothesis. Was it because the Arabs wanted to strip that famous hellenistic centre and Eastern outpost of the Roman Empire of the special privileges which the possession of an imperial mint undoubtedly was ? At any rate this line of policy was not applied to other important Byzantine centres like Alexandria and Carthage.Or was it because the shifting of importance from Antioch to Damascus as the seat of the Arab governor was associated with the transferenée of the mint ? This would still leave open the problem of the appearance of the new mints. in other minor localities.Can one go as far as to interpret this apparent decentralisation of minting production as the manifestation of reaction against the highly centralised system of the Byzantines ? If such a tendency really existed it was later contradicted by the attitude of ʿAbd al-Malik and his successors.

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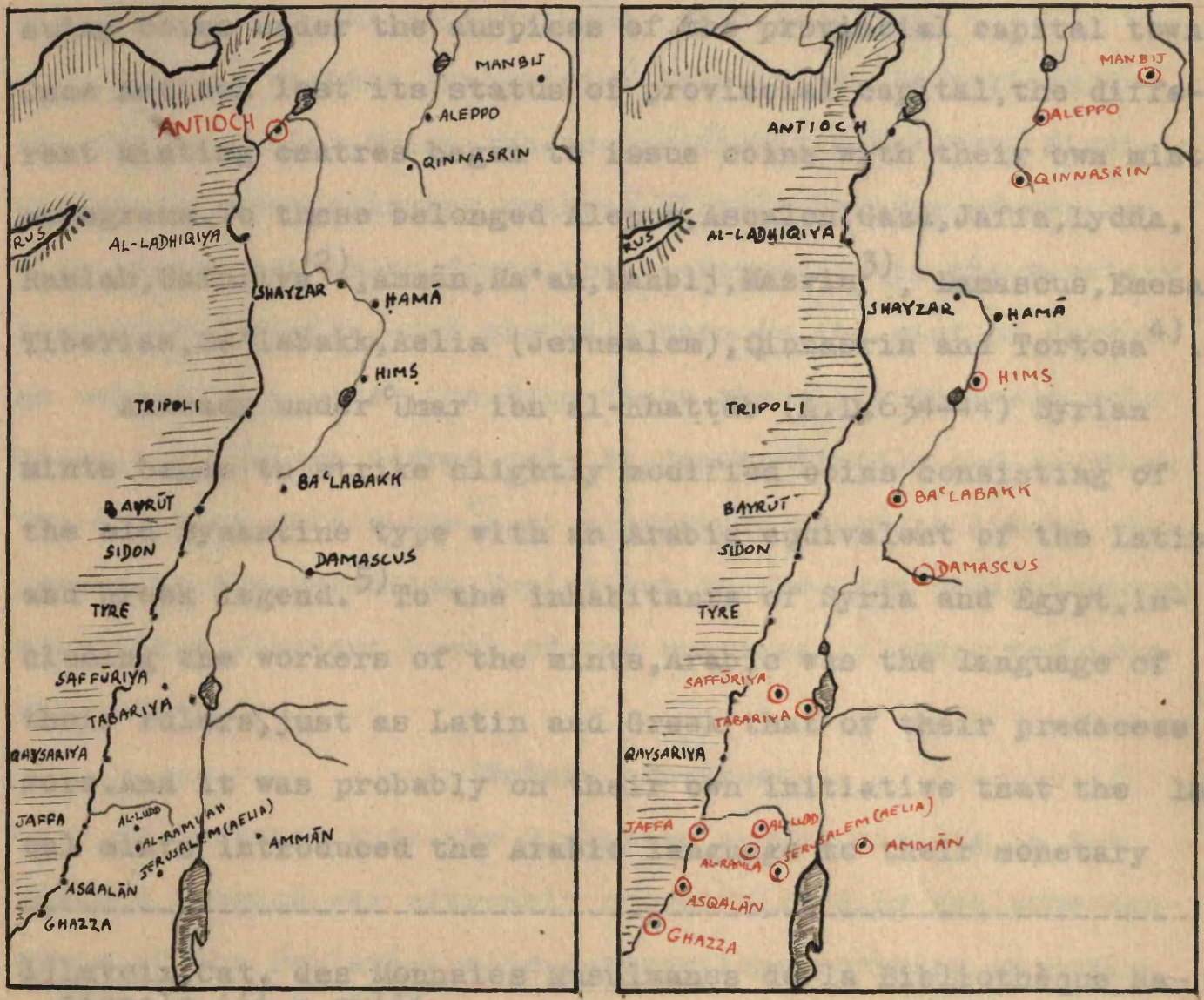
1)Wroth,Cat.of the Imperial Byzantine Coins in the B.M.,i.223

Sketch 1

Mints ⊙ of Syria

a. before and b. after the Conquest.



(based on numismatic evidence only)

A quite plausible explanation is offered by Lavoix.[1] He rightly points out that the Arab conquerors were not giving but taking from the Byzantine provinces.They could not,therefore,create new mints.These centres,concludes Lavoix,must have existed under the Byzantine administration, but were issuing coins under the auspices of the provincial capital town. Once Antioch lost its status of provincial capital,the different minting centres began to issue coins with their own mint monograms.To these belonged Aleppo,Ascalon,Gaza,Jaffa,Lydda, Ramlah,Safuriya[2],Ammān,Ma'an,Manbij,Masrin[3], Damascus,Emesa, Tiberias,Ba'labakk,Aelia (Jerusalem),Qinnasrin and Tortosa[4].

Already under ʿUmar ibn al-Khaṭṭāb (A.D.634-44) Syrian mints began to strike slightly modified coins consisting of the old Byzantine type with an Arabic equivalent of the Latin and Greek legend.[5] To the inhabitants of Syria and Egypt,including the workers of the mints,Arabic was the language of their rulers,just as Latin and Greek that of their predecessors.And it was probably on their own initiative that the local mints introduced the Arabic language to their monetary

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1)Lavoix,Cat. des Monnaies Musulmanes de la Bibliothèque Nationale,iii.p.xviii

2) ibid.i.pp.1-16,iii.p.xviii

3)Lane-Poole,Cat.of Oriental Coins in the B.M.,i.pp.1 - 16

4)Stickel,Älteste Muhammedanische Münzen.,pp.14 - 24

5) ibid.,pp. 8,15,17

issues to keep pace with the new political circumstances.The coins bearing the name of ʿUmar (ibn al-Khaṭṭāb) were in fact produced,[1] but the prevailing lack of a consistent uniform type,rules out the existence of any policy on the part of the new régime,to influence directly the activities of the former Byzantine mints in the area under consideration.

Neither was the Arab régime felt in the operations of the Carthage mint.This Arab acquisition was,however, significant for the following reasons.Firstly because of separatist tendencies which found their expression in the monetary issues of Ifrīqiya, and secondly because the mint of Carthage had enjoyed under the Byzantines the right to issue gold coins,a privilege shared only by Constantinople and Ravenna. The issue of gold coins[2] by a province which no longer belonged to the Byzantine Empire but to the Arab Caliphate, constituted a flagrant break of the universally respected imperial monopoly.

b.Sāsānid provinces.

In contrast with the Byzantine system,minting in the Sāsānid kingdom was extremely decentralised.By toilsome analysis of the Pehlevi-Arabic inscriptions occuring on early

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1)Stickel,Älteste Muhammedanische Münzen.,p.8

2)Wroth,Cat.of the Imperial Byzantine Coins in the B.M.,i.288

Sassanian-Arab coins,some 50 of these mints have already been identified.[1] A great deal still remains to be located. Some of them,according to Dr.Walker,will never be deciphered. Except for the conclusions drawn from numismatic evidence nothing is known about the relation of this network of mints to the ruler of the kingdom,but the uniform type of silver coins (in distinction from the Byzantine official gold currency, that of the Sāsānids was based on silver),with the effigy of the ruling sovereign suggests that the head of the kingdom enjoyed some kind of suzerainty over the scattered minting centres,be it only a nominal one.

Whereas in Syria and Egypt the Arabs merely substituted their own supremacy for that of the Byzantines,their eastward expansion involved them in fierce conflict with the 'national' kingdom of the Sāsānids.In spite of this essential difference between the two conquests,the attitude of the Arabs towards the mint production in the conquered Sāsānid territories did not differ from the policy of the governors in the West.The long years of obstinate struggle reduced the number of mints. Those which passed under the domination of the new rulers, carried on their normal operations.The establishment of the new régime was marked,however,by the quick appearance of Arabic legend in Kufic script[2],the subsequent rejection in

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1)cf.,Walker,Cat.of the Arab-Sassanian Coins,p.XCIX

2)ibid.,p.3

A.H.32 (A.D.652), of the 'Yezdegird III' type of coins and the issue of the popular 'Khusrau II ' type of coins.[1] The very fact that the coins of this elebrated Sāsānid king were selected to serve as a standard type under the Arab newcomers implies the existence of an institution whose decisions in respect of monetary issues were widely respected. Apart from this circumstance there is no trace of any attempt, on the part of the Arabs, to alter the inherited Sassanian mint system during this early transition period.

2. The pre-reform Umayyad period (A.D.661 - 690).

The reign of Muʿāwiya ibn Abī Sufyān (A.D.661 - 680) forms a link between the early transition and the post-reform Umayyad period. In his successful attempts to give his kingdom a solid structure based on the inherited Syro-Byzantine administration, Muʿāwiya organised a centralised fiscal system.[2] Textual and numismatic evidence show that these activities also embraced the problem of the mints, introducing new measures which constituted the foundation stone of ʿAbd al-Malik's reform.

In his treatise on coins, Maqrīzī says that some monetary changes like the devaluation and the striking of 'Khusrau

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1) cf., Walker, Cat. of the Arab-Sassanian Coins, p.5

2) cf. Lammens, Etudes sur le règne du Calife Omaiyade Moʿâwiya Ier, p.198

II ' dirhams with Arabic by-legends had already been undertaken by ʿUmar ibn al-Khaṭṭāb and ʿUthmān ibn Affān [1].
This statement is rendered untenable not only by the numismatic evidence but also by information supplied by Balādhurī[2] and Maqrīzī himself[3], according to which the pre-conquest types of coins had remained unaltered until the innovations of Muṣʿab ibn al-Zubayr. Conversely, another statement of Maqrīzī[4], incompatible with the former one, is reflected in the available numismatic material. According to Maqrīzī the final decision about the standard of dirhams, struck under Muʿāwiya, belonged to the caliph himself, his order being carried out by Ziyād ibn Abīhi, governor of the Eastern part of the kingdom. Furthermore Muʿāwiya is credited to have issued dinars with a standing effigy of the caliph.

In the light of the existing numismatic evidence it was really this Muslim ruler whose name first appeared on the Sassanian-Arab dirhams struck in Darabjird in A.H.41 [5], the year of Muʿāwiya's accession to the caliphate (A.D.661). As for Ziyād ibn Abīhi, he really struck similar coins in the same mint,

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1) Mq., Shudh. Mayer, p.4

2) Balādhurī in Sauvaire, Matér., JA (1879), p.461

3) Mq., Traité des Poids et des Mesures Légales, de Sacy, p.73.

4) Mq., Shudh., Mayer, p.4

5) Walker, Cat. of the Arab -Sassanian Coins, p.25

yet not in Muʿāwiya's, but in his own name[1]. So did other Eastern governors down to the reform of ʿAbd al-Malik.[2]

In spite of its inexactitude the information of Maqrīzī about Mu awiya issuing dinars of the 'standing caliph' type, contains some elements of truth. Wellhausen[3] who quotes the Syrer, Lavoix[4] expecting a discovery of dinars in question, and Martinori[5] who wrongly interpreted an early Byzantine dinar, are the authorities who by seeing in Muʿāwiya the first Muslim ruler to strike gold coins, support the statement of Maqrīzī. The existing numismatic material makes this opinion inacceptable. The truth is that Muʿāwiya introduced a new 'standing caliph' type not of dinars but of copper coins (fulūs)[6], examples of which are available. The fact that this 'standing caliph' type was later adopted by ʿAbd al-Malik as the model for his early dinars probably gave rise to the confusion in the statement of Maqrīzī.

The above evidence makes it possible to assume that during the reign of Muʿāwiya the Arab caliphate took the first steps

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1) Walker, Cat. of the Arab-Sassanian Coins, p.xlii

2) ibid., p.xxxvii, cl,

3) Wellhausen, Das Arabische Reich und Sein Sturz, p.136

4) Lavoix, Cat. des Monnaies Musulmanes de la Bibliothèque Nationale, i. p.xxvii

5) Martinori, LaMoneta, p.110

6) Stickel, Älteste Muhammedanische Münzen., pp.26, 28, 33

to establish its influence over the existing mints.As a result of this interference,the mints in Syria began to strike a new type of fulūs,substituting the figure of the caliph for the imperial effigy.The Arab-Sassanian type with the name of Mu - ʿāwiya indicates that the governors of the former Sāsānid provinces began to establish control over the local minting system on behalf of the central authority,but similar monetary types, issued in their own name, prove that they did not consider it as an exclusive prerogative of the caliphate.[1)]

3.<u>The Umayyad post-reform period (A.D.690 - 750).</u>

Among the circumstances preceding the big-scale reforms of ʿAbd al-Malik (A.D.685 - 705) there are two which,in my opinion, should be mentioned here, as bearing upon the subject of the present inquiry.The first was the skilful exploitation by the partisans of the rival caliph ʿAbdallāh ibn al-Zubayr (A.D. 683 -692) of the mints in their possession.There are several examples of Arab-Sassanian coins struck in the name of ibn al-Zubayr,some of which bear his name with the title 'ʿAbdallāh Commander of the Faithful'.[2)] Considering the fact that some of ibn al-Zubayr 's governors used to issue coins also in their own names[3)],and that this rival caliph exercised no

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1)cf.,Walker,Cat.of the Arab-Sassanian Coins,p.cl

2)<u>ibid</u>.,p.xlii

3)<u>ibid</u>.,p.xlii

real authority,but served merely as a cover for the Anti-Umayyad party[1], the coins issued in his name should not be regarded as a manifestation of his effective control over the mints,but as a means of propaganda,spread by those of his partisans who had mints at their disposal. The lack of a uniform type of coinage and the decentralised,scattered minting production in the former Sāsānid territories offered an opportunity to issue coins,the inscriptions on which were directed against the authority of the Umayyad Caliphate.

The second circumstance was the fact that ʿAbd al-Malik was probably facing a shortage of gold currency.The influx of the Byzantine 'solidi',whose production in that Eastern Mediterranean area was exclusively restricted to Constantinople, obviously suffered by the Arab invasion.The accumulated reserves were spent by ʿAbd al-Malik's predecessors.It is enough to recall the heavy commitments of Muʿāwiya in order to come to terms with the Byzantines[2].ʿAbd al-Malik himself was impelled to renew the armistice with Justinian II (A.D.685-695,705-711) for a sum of gold pieces,which exceeded that paid by Muʿāwiya [3].This monetary crisis brought about an event which had a tremendous influence upon the whole course of Medieval

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1)Wellhausen,Das Arabische Reich und Sein Sturz,p.125

2)Ostrogorsky,Geschichte des Byzantinischen Staates,pp.73,81

3) ibid.,p.85

economic history. A mint of the caliph began[1] to produce dinars which were to become the official currency of the Caliphate. Although the name of this mint does not occur on these dinars, there exists evidence which suggests Damascus as the site. The very fact that the coins bear no mint name suggests its special status in distinction from other mints issuing dirhams or fulūs. Considering that such a mint had to be established under the strict control of the highest authority of the state, it is safe to regard the mint of that chief administrative centre of the Umayyads to have been entrusted with that sort of production. Besides this 'negative' numismatic evidence there is a detail in Balādhurī[2] according to which gold coins struck under ʿAbd al-Malik were called 'Damascus dinars'. Another argument in favour of this location is mentioned later in connection with the installation of the ʿAbbāsid dynasty.

The minting of gold coins by the caliph has a twofold significance. While, on the one hand, it shows the high degree of political emancipation of ʿAbd al-Malik, which allowed him to disregard the Byzantine monopoly[3], it indicates, on the other hand, that the caliph had an experienced minting staff able to produce gold coins of the same standard of fineness as those

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1) for chronology of the reform of ʿAbd al-Malik see Stickel, Älteste Muhammedanische Münzen, pp.43-53.

2) Balādhurī in Sauvaire, Matér., JA (1879), p.463.

3) Truly, gold coins are likely to have been issued throughout this early phase in Ifrīqiya (though no examples are avai-

issued by the imperial Byzantine mint.

The dinars issued by the mint of Damascus went through the usual process of evolution.From being an exact imitation of the Byzantine solidus,to the 'standing caliph' type in A. H.74,(A.D. 693-694),and finally,to the new purely Islamic type of dinars in A.H.77 (A.D.697).Two years later this type was also adopted for dirhams[1].

The fixing of the new type of Muslim coinage was another big achievement of ʿAbd al-Malik.Replacing the effigies with versets such as لا اله الا الله وحده لا شريك له - الله احد الله الصمد لم يلد ولم يولد ولم يكن له كفوا احد

and

مُحَمَّدٌ رَسُولُ ٱللَّهِ بِٱلْهُدَىٰ وَدِينِ ٱلْحَقِّ لِيُظْهِرَهُۥ عَلَى ٱلدِّينِ كُلِّهِۦ وَلَوْ كَرِهَ ٱلْمُشْرِكُونَ (Qur'ān, IX,33)

may be considered as an emphasized reaction on the part of the Arab Caliphate against the established symbols of the Byzantine and Sāsānid past.The insertion of personal names,including

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lable until A.D.715-6).But the mint of that remote province had probably operated quite independedently from the central authority.Its gold issues must,therefore,be regarded at that stage as a survival of the former régime rather than an innovation of the Arabs.

1)On the authority of Dr.Walker.

that of the caliph,was prohibited.This measure may have had the aim of preventing the coins from being exploited by hostile propaganda.[1]

To achieve successfully his reform ʿAbd al-Malik needed a strong hold over all the existing mints.He found in al-Ḥajjāj a man who undertook the task of imposing the new type all over the former Sāsānid area.Except for the outlying Eastern provinces,where the latest of the Arab-Sassanian coin survivals still appear under the immediate successors of the ʿAbbāsid caliph Harūn al-Rashīd (A.D.786-809),[2] all the existing mints in the Eastern part of the Umayyad kingdom were forced to adopt the reformed type of coins.As for the Western part, here the mint of Ifrīqiya and,later,that of Spain,seemed to have resisted the authority of Damascus,in so far as they never ceased to add their respective monograms to the Islamic legends on dinars.[3]

Al-Ḥajjāj is also credited with the opening of the first mint to be built under the Arab régime.[4] Though textual sources do not specify where this event took place,numismatic data speak in favour of Kufa as the site of its location.The estab-

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1)For the problem of the coinage of propaganda,see M.Grant, The Coinage of Propaganda,The Listener,Nr.1180 (11.10.1951)

2)Walker,Cat.of the Arab-Sassanian Coins,p.xxvi

3)Lavoix,Cat.des Monnaies Musulmanes de la Bibliothèque Nationale,i.pp.37,38,109,116.-also Miles,The Coinage of the Umayyads of Spain,i.p.21

4)Sauvaire,Matér.,JA (1882),p.281

lishment of the mint was accompanied by the fixing of the percentage allotted to this institution from the minted metal, to cover the salaries of minters whose official status was stressed by tattooing their arms.[1] Another new mint was constructed by al-Ḥajjāj in wāsiṭ,its earliest available coin dating from A.H.85 (A.D.707).[2] The settling of the budget of the mints, reflected in Maqrīzī's text[3],the severe measures (cutting off one arm) applied to forgers[4],and the uniformity of production,all these indicates that ʿAbd al-Malik bequeathed to his successors an efficient minting organisation which constituted one of the sources of revenue of the caliphate.

It was during the caliphate of Hishām ibn ʿAbd al-Malik (A.D.724-743) that an attempt was made to reduce the number of minting centres.Hishām , well known for his successful financial policy[5],attempted a drastic tightening of control over this source of revenue.Although he never succeeded in restricting the production of coinage to Wāsiṭ only,as claimed by Maqrīzī[6],the analysis of mint names occuring on dir-

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1)Balādhurī.,Futūḥ al-Buldān,edn.Egypt.p.454

2)Lane-Poole,Cat.of Oriental Coins in the B.M.,i.pp.23,27

3)Mq.,Shudh.,Mayer,p.5

4)Balādhurī.,Futuḥ al-Buldān,edn.Egypt,p.455

5)Gabrieli,Il Califfato di Hishām ,p.123,ff.

6)Mq.,Shudh.,Mayer,p.7

hams struck during the reign of Hishām, shows indeed the disappearance of many old Sassanian mints.

The reforms of the Umayyads show that, apart from remote provinces, the rulers of this first dynasty exercised effective control over the mints of the Muslim Empire. The Monopolistic measures, such as those attempted by Hishām, betray Byzantine influence affecting the minting policy of the Umayyad caliphate. On the other hand, the lack of any effigy on the post-reform Umayyad coins is an innovation foreign both to Byzantine and Sāsānid offial coins.

4. The ʿAbbāsid period.

The centralised character of the Umayyad mint system whose symbol was its uniform type of coins, could only be maintained within the framework of a strong state organisation. With the cracking of the Umayyad administration some mints like Balkh[1], al-Taymara[2], Jayy[3], Rayy[4], Mahy[5], and Ramhurmuz[6], whose activities were completely stifled by the effective measures of Hishām ibn ʿAbd al-Malik, began to operate again. The

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1) Lavoix, Cat. des Monnaies Musulmanes de la Bibl. Nat., i. p. 132

2) ibid., i. p. 132

3) ibid., i. p. 133

4) ibid., i. p. 133

5) ibid., i. p. 133

6) Lane-Poole, Cat. of Oriental Coins in the B.M., i. p. 33

appearance,on coins struck by these mints,of a by-legend قُلْ لَا أَسْأَلُكُمْ عَلَيْهِ أَجْرًا إِلَّا الْمَوَدَّةَ فِي الْقُرْبَىٰ (Qurʾān,xlii,22) not only meant the provocation of the central authority,but was also an early forerunner of changes to take place under the new dynasty.Some of these changes were undoubtedly due to the authority of the early ʿAbbāsids,others, which eventually led to the complete severance of any administrative bonds between the mints and the throne,were brought about by the gradual decline of the power of the ʿAbbāsid dynasty.

Whereas the Umayyad caliphs relied for their power on Syria whose official currency was based on gold,the ʿAbbāsids established the centre of their authority in the former Sāsānid territories,where silver was in official use.(In both these areas,of course,copper coinage was struck for limited local needs.Although this type of unofficial currency followed,on the whole,the fashion of dirhams,yet I don't think that the control over this type stretched beyond the competence of local administrations).

The date A.H.132 (A.D.750), appearing on the earliest available ʿAbbāsid dinar [1], coincides with the year of the conquest of Damascus.This fact constitutes another argument [2] in favour of Damascus as the place of origin of the dinars in that

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1)Lane-Poole,Cat.of Oriental Coins in the B.M.,i.p.34

2) cf.discussion above,p.43

area.It also indicates that gold coins of the ʿAbbāsids were struck only after the extension of their authority over the Western part of the Empire.The dinars of the ʿAbbāsids,like tho se of the Umayyads, bear no mint names,at least until the reign of al-Mā'mūn.It is,therefore,difficult to establish how long they remained to be struck in Damascus.Presumedly the striking of dinars was continued in Ifrīqiya,and,judging by the names of Egyptian governors appearing on the dinars of al-Hādī, it was also undertaken at a certain date by the Egyptian mint The production in Damascus was,most probably,suspended in favour of the newly established ʿAbbāsid capital in Baghdād.Whatever its date may be[1], the beginning of the striking of dinars in Baghdād was an important event.The emission of gold coins in the former territory of the Sāsānids opened a new chapter in the minting history of the Eastern part of the caliphate.

The brutal measures applied to some of the former supporters of the revolution are reflected in the numismatic issues of the early ʿAbbāsids.Their original revolutionary slogan is abandonnéd and a new formula adopted on the reverse of both dinars and dirhams (محمد رسول الله).Except for a temporary resistance of the mint of Ifrīqiya[2] which adhered to the Umayyad legend,and for the mint of Spain which,with the establishment of the Umayyad principality,became completely detached from Baghdad,the ʿAbbāsid type of legend came to be universally adopted.This fact suggests that the ʿAbbāsid ca-

1)The chemical analysis of the nameless dinars may permit to draw conclusions about their origin.
2)Lavoix,Cat. des Monnaies Musulmanes de la Bibl.Nat.,i.p.139

liphs succeeded in imposing a certain uniformity in the minting production.

During the reign of al-Manṣūr (A.D. 754-775) dirhams began to lose their anonimity. The name of his successor al-Mahdī appears on silver issues, the earliest available example dating from A.H. 141 [1]. The insertion of the name of the heir to the throne was undoubtedly one of the ways in which the will of sovereign was publicly proclaimed. But the composition of the formula which reads مما امر به suggests that the mints adopting it, were recognizing the administrative authority exercised over them by the throne, when with the lapse of time these mints passed under direct authority of semi-independent rulers, the formula 'By order of the caliph ' was dropped, but the name of the ruling caliph maintained.

This new practice deprived the currency of the ʿAbbāsid dynasty of that remarkable anonymous character which was so typical for monetary issues of the Umayyads. Though they abolished the name of the ruler from their coins, the Umayyads maintained control over the mints. The development under the ʿAbbāsids led, on the contrary, to a paradoxical situation. In the course of the 9 th century A.D. the name of the ruling sovereign begins to appear on coins struck all over the Muslim territories (including Spain, until the Umayyads assumed the title of the caliph), but by then, the ʿAbbāsids caliphs exercise none, but purely nominal authority over the mints.

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1) Lane-Poole, Cat. of Oriental Coins in the B.M., i. p. 42

With the succession of al-Mahdī (A.D.775-785) to the throne, for the first time, since the reform of ʿAbd al-Malik of course, the name of the caliph appears on dirhams[1]. Further development takes place during the short term of al-Hādī 's office (A.D.785-786). For the first time personal names appear on issues of gold.[2] The appearance of various personal names both on dinars and dirhams shows that the right of having their names imprinted on coins was, by no means, an exclusive prerogative of the caliphs. It also indicates that various authorities were assuming responsibilities for the minting production.

The reign of al-Rashīd (A.D.786-809) marks a further step in the evolution of the relationship between the person of the caliph and the minting problems. Not only does the name of the ruling sovereign make its appearance on dinars[3], but also a new office is set up with the task of supervising the standard of the official coinage. According to Maqrīzī, Hārūn al-Rashīd was the first caliph who gave up the personal supervision of the standard of coinage, delegating that duty to Jaʿfar ibn Yaḥya al-Barmakī[4], his famous favourite. G.C.Miles proposes to consider this appointment as an honorary one, which, together

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1) Lane-Poole, Cat. of Oriental Coins in the B.M., i.p.539

2) ibid., i.p.61

3) ibid., i.p.66

4) Mq., Shudh., Mayer, p.8

with the striking of coins with the name of Ja'far should be regarded as one of many favours bestowed by Harun upon his intimate friend.[1] The change in the legend of coins introduced by al-Sindī, who succeeded the executed Ja'far, prompts Miles to reconsider his previous view. He says: 'Ja'far may have had more than nominal administration of the coinage!'[2] In my opinion, Maqrīzī's information, together with those concerning the two consecutive successors of Ja'far, must be accepted at their face value. In the light of these data, the supervision of the coinage until the reign of Hārūn al-Rashīd remained under the personal charge of the caliphs and was not, therefore, submitted to any particular administrative department. Under Hārūn al-Rashīd a new practice was introduced, in accordance with which the caliph delegated that charge to a person chosen by him. The appointment to this office was not necessarily attached to an administrative function performed by the chosen candidate (like the vizirate for instance), but depended merely on the caliph's will. Al-Sindī, appointed by Hārūn al-Rashīd after Ja'far's death, never performed the function of vizir.[3] Yet, under his administration, the coinage of the caliphate reached stan-

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1) Miles, The Numismatic History of Rayy, pp.60-61

2) ibid., p.84

3) for the part of al-Sindī in the 'liquidation' of the Barmakids see Bouvat, Les Barmécides d'après les Historiens Arabes et Persans, p.91

dard which was to be remembered by later generations [1]. Al-Faḍl ibn al-Rabī' became vizir in A.H.187 [2] in place of Ja'far ibn Yaḥya. But he was appointed the superintendent of coinage only by the caliph al-Amīn (A.D.809-813). Coins bearing the name of al-Faḍl issued during the caliphate of al-Amīn seem to confirm Maqrīzī's information. Here is a list of the consecutive superintendents of the coinage of the caliphate, based on the authority of Maqrīzī and on the available numismatic material:

name of the superintendent	Dates in A.H.	The caliph
Ja'far ibn Yaḥya [3]	177-187	al-Rashīd
al-Sindī b. Yaḥya al-Harashī	187-193	"
al-Faḍl ibn al-Rabī' [4]	193-196	al-Amīn

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1) Mq., Shudh., Mayer, p.11

2) Zambauer, Manuel de Genéalogie et de Chrohologie, i.p.6

3) In the light of the above, I cannot accept Zambauer's view (Manuel, i.6), that Ja'far's nomination to the vizirate took place in that year in which his name appears on the coins. Could not the appearance of Ja'far's name on the official coinage have merely been the consequence of his appointment to the post of the superintendent of coinage, before his accession to the vizirate?

4) Mq., gives al-'Abbās ibn al-Faḍl, which must be a mistake on the part of the Arab historian, or his original source.

A question posing itself is how long this institution existed, or how long it preserved its original character? That is to say, whether the real effective supervision of coinage did not develop into a degenerate form, that of a purely nominal function bestowing, however, upon its bearer the honour of having his name put on coins, not to speak of some financial advantages, undoubtedly attached to the performing of such function. Can not the appearance of the names of al-Faḍl ibn Sahl and that of Ṭāhir ibn al-Ḥusayn on the coins of al-Mā'mūn (A.D. 813-833)[1] indicate that these two supporters of the caliph performed the function in question during their long political career? It would be a risky undertaking, however, to rely for t that purpose on coins only, -considering for instance, that the name of the second superintendent, al-Sindī, does not appear on coins altogether. As for al-Faḍl ibn Sahl and Ṭāhir ibn al-Ḥusayn, the former was an efficient vizir[2], and the latter a successful military leader enjoying, after al-Mā'mūn's victory in A.D.813, the post of honorary prefect over various provinces, But, though he was an honorary prefect of Damascus,[3] his authority did not extend over Egypt, and yet his name ap-

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1) Lane-Poole, Cat. of Oriental Coins in the B.M., i. p.95

2) Zambauer, Manuel, i., p.6

3) ibid., i. p.28

pears on Egyptian coins[1]. What was then the legal, the formal foundation for the issue of coins in their respective names, if not the privileges derived from the office introduced by Hārūn al-Rashīd ? The vestiges of this office seem to linger on still under al-Mutawakkil (A.D.847-61) who is said to have submitted all the mints of the caliphate to al-Muʿtazz.[2]

In studying the names on the coins originating from the period which extends from the reign of Hārūn al-Rashīd until that of al-Mutawakkil, one realises how restricted was the number of mints remaining under the authority of these superintendents. Besides the Umayyads of Spain, the Aghlabids in Ifrīqiyah and, later, various petty dynasties, used to administer their respective mints without interference on the part of the officers in question. When Ṭabarī and Ibn Khaldūn speak about the supervision of coinage, they probably mean by it those of the mints which lay in the territories under the direct administration of Baghdād. It was probably the only category of mints that yielded profits to the treasury in Baghdād. Judging by the list of sources of revenue, dating from A.D.903, the ʿAbbāsid caliphate possessed, by the beginning of the 10 th century, only 5 mints at its disposal. They were : Baghdād, Samarra,

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1) Lane-Poole, Cat. of Oriental Coins in the B.M., i. p.95

2) Ibn Khaldūn, edn. Būlāq, iii. p.275. cf. Sauvaire, Matér. JA (1882) p.285

Kūfa, Wāsiṭ and Baṣra.[1]

It was during the reign of Hārūn al-Rashīd that the caliphate lost ist monopoly to the issue of gold coins. Dinars struck by the Aghlabids, the first example dating from A.H.191 (A.D.806-7)[2] was the first break of the hitherto prevailing rule. Further decentralisation followed apace. Instead of three dinar issuing mints (Baghdād, Egypt, Ifrīqiya) under al-Rashīd, the number of such mints in A.H.276 (A.D.889) amounted to about twenty.[3] Since, beginning with the time of al-Mā'mūn[4], the mint names appear on issues of gold coins, this number can be arrived at quite easily.

The production of gold coins by several mints in the former Sāsānid territories was a remarkable phenomenon which took place under the ʿAbbāsid dynasty. With the disappearance of that last prerogative of the caliphs, there remains practically nothing to distinguish the office of the caliphs from the many petty princes or governors who, in establishing their power over various provinces, were assuming responsibility for the production of coins in the mints operating in their

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1) Kremer, Ueber das Einnahmebudget des Abbasiden, p.27

2) Lavoix, Cat. des Monnaies Musulmanes de la Bibl. Nationale, iii. p.345

3) Miles, The Numismatic History of Rayy, .119

4) Lane-Poole, Cat. of Oriental Coins in the B.M., i. p.92

territories (in so far as their authority over the mints was concerned).The custom of striking coins in the name of the ruling caliph,was not so much a manifestation of the once existing authority of the suzerain over the mints,as rather a token of allegiance expressed in this way by the ruler of a territory in which particular mints were operating.

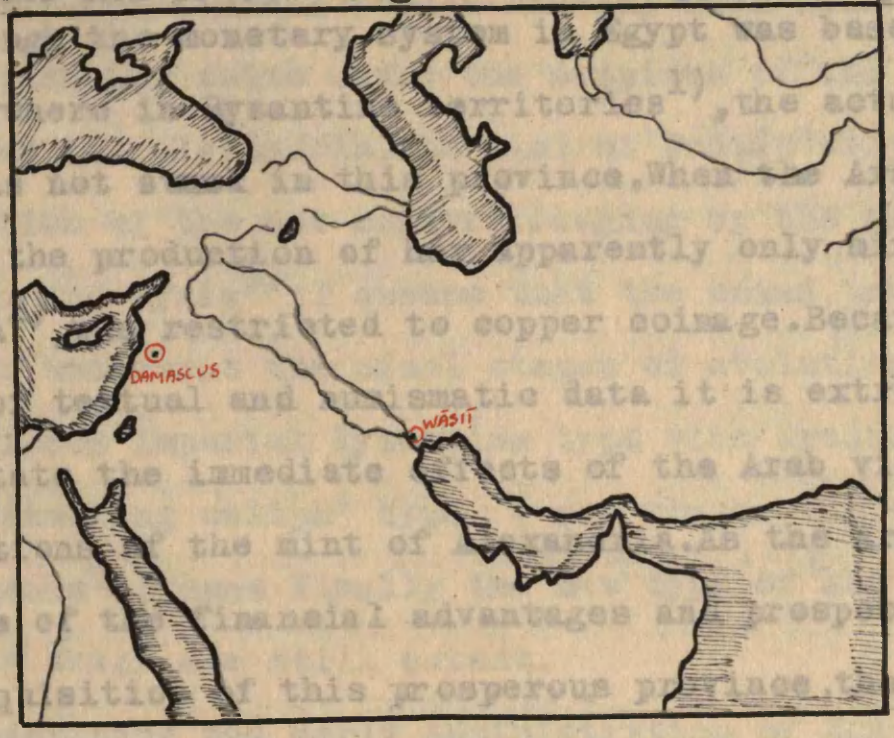
Thus,about 100 years after Hishām ibn ʿAbd al-Malik,under whose reign the centralisation of mints reached its apogee,the ʿAbbāsids had lost all the prerogatives of their predecessors.The revival of trade and industry,necessitating an increased production of coins, and the rise of many petty rulers possessing their own mints,both these factors caused a complete decentralisation of the mint system of the caliphate.

The inherent Byzantine tendency to monopolism,which was at the root of the Umayyad policy towards the mints of their state had to give way, under the ʿAbbāsid dynasty, to other influences.The rise of a great number of scattered minting centres absolutely emancipated from the control of the capital, the name of the ruling caliph on the coins,establishing a link with Baghdād in the same way in which the pre-islamic dirhams were linked by the effigy of the sovereign,-these are characteristics which tempt me to state that the mint system of the ʿAbbāsids, represents another aspect of the problem of the revival of Sāsānid traditions under the ʿAbbāsid dynasty.

Sketch 2

showing Mints ⊙

a. towards the end of the reign of the Umayyad caliph al-Hishām



b. towards the end of the reign of the ʿAbbāsid caliph alMuqtadir

Chapter II

E G Y P T I A N M I N T S

Although the monetary system in Egypt was based on gold, like everywhere in Byzantine territories[1], the actual gold coinage was not struck in this province. When the Arabs conquered Egypt, the production of her apparently only mint, that of Alexandria[2], was restricted to copper coinage. Because of the scarcity of textual and numismatic data it is extremely difficult to state the immediate effects of the Arab victory upon the operations of the mint of Alexandria. As the Arabs were well aware of the financial advantages and prospects offered by the acquisition of this prosperous province, they aimed in their policy at such a stability of economy which would ensure a regular supply to the treasury of the caliph, or to the pockets of the particular governors. To achieve this the conquerors not only maintained the existing administration, but also came to terms with Nubia[3], securing thus trade relations between Egypt and the African background. Normal commercial and industrial activities were bound to cause a demand for a steady supply of coins whose production was, most probably, continued in the former imperial mint of Alexandria. Alexandria

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1) West and Johnson, Currency in Roman and Byzantine Egypt, p.169

2) Wroth, Cat. of the Imperial Byzantine Coins in the B.M., p.227

3) Lane-Poole, A History of Egypt, p.21

was not,however,the only mint operating under the new régime. The available coins from the early Muslim Egypt originate from Fayyūm[1], Atrīb[2] and Fusṭāṭ,[3] not to mention Alexandria[4] itself. Whereas the first two might have already been active under the Byzantines,issuing coins under the auspices of the mint of the Egyptian capital Alexandria,the mint of Fusṭāṭ was,of course, a contribution of the new masters.Judging by the development in Carthage and Syria[5], I assume that the coins, produced by these mints, underwent the usual stages of evolution,beginning with the direct imperial Byzantine type with Arabic legends[6], then the 'standing caliph' type (see chapt. I,p.41) with Arabic legends , and finally the new type of ʿAbd al-Malik[7], examples of which are still extant.

In describing the early administration of Egypt Lane-Poole states,on p.18 of his History of Egypt,that the Egyptian mint was submitted to the control of the chief qadī.Though true of the status of the mint under the Fāṭimids,this statement is

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1)Lavoix,Cat. des Monnaies Musulmanes de la Bibl.Nationale,i. p.397

2)Miles,Rare Islamic Coins,pp.32-33 .For importance of Atrīb and Fayyūm,see Maspero,Wiet,Matériaux pour servir à la Géographie de l'Egypte,1ser.pp.4 and 142 respectively.

3)Lane-Poole,Cat.of Oriental Coins in the B.M.,i.p.184

4)Lane-Poole,Cat.of the Collection of Arabic Coins..in the Khediviale Library.,pp.114-115

5)Lane-Poole,Cat.of Oriental Coins in the B.M.,Add.i-iv.p.17

6)ibid.,Add.,i-iv,p.16

7)ibid.,i.p.193

absolutely out of place as regards the Umayyad administration of Egypt.Judging by the textual evidence recording the introduction of the reformed Islamic coinage by ʿAbd al-Azīz ibn Marwān [1], the governor of Egypt, the Egyptian mints remained in the Umayyad period under the control of provincial governors. This seems to be confirmed by the fact that the available post-reform Egyptian coins bear the name of the governor.[2]

The reign of the ʿAbbāsids brought about a substancial change in Egyptian minting production.The shifting of the focus of the Muslim Empire from Syria to Baghdād not only increased the distance between Egypt and the capital of the ʿAbbāsids, thus creating propitious conditions for political emancipation, but also caused the intensification of commercial activities along the old ʿIrāqī trade routes.As all the 'international' trade relations in the Mediterranean area were based on gold currency, any intensification or dislocation of commercial traffic was bound to influence the production of gold coinage.The Egyptian market under the Umayyads could be supplied with dinars from the mint in Damascus.When the production of dinars in Damascus was abandoned in favour of the remote Baghdādī mint (see chpt.I.p.49), difficulties in the supply grew proportionately to the distance.As the production of the

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1) Abū al-Mahāsin,Al-Nujūm al-Zāhira,edn.Juynboll,i.p.195

2) Lane-Poole,Cat.....of Arabic Coins..in the Khediviale Library.,pp.114-115

Baghdādī mint was chiefly concentrated on meeting administrative and commercial requirements of the Eastern part of the Empire,there was no other solution but to begin the striking of gold coinage in Egypt itself.This event,whose exact date like that of the opening of the Bagdādī mint,is uncertain,begins a new phase in the history of the mints in Muslim Egypt, during which gold coinage was to become the most important item of its minting production.

The names of Egyptian governors which begin to appear sporadically on the ʿAbbāsid dinars,from the year A.H.167 (A.D. 783) [1] onwards,not only remove doubts concerning their Egyptian origin,but also offer ground for a consideration of the status of the Egyptian mint within the framework of that province.It seems that the Egyptian mint was submitted to the authority of the governor,to the exclusion of the treasurer of that province (Ṣāḥib al-Kharāj),who was frequently an official appointed by and responsible to the caliph himself.It is significant that the available Egyptian issues from A.H.167 to 178 A.D.783-794) do not show the names of the caliph.Here is the list [2] of the governors and treasurers of Egypt in those years, and of the names appearing on the Egyptian dinars struck in corresponding years :

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1)Lane-Poole,Cat....of Arab Coins...in the Khediviale Library, nr.863

2) based on Lane-Poole's catalogues,the Cat. of Lavoix,and Zambauer ' s Manuel.

year A.H.	names of the governor	of the treasurer	on the coins
167	Ibrāhīm b.Saliḥ	-.-	Ibrāhīm b.Saliḥ
170	ʿAlī b.Sulaymān	_._	ʿAlī
171	Mūsā b.ʿĪsā	-.-	Mūsā
174	Dāwūd b.Yazīd	Ibrāhīm b.Saliḥ	Dāwūd
175	Mūsā b.ʿĪsā	Naṣr b.Kulthūm	Mūsā
178	Mūsā b.ʿĪsā	Naṣr b.Kulthūm	Mūsā

When Hārūn al-Rashīd set up the office of the inspector of the coinage (see chapt.I.p.51 ff.) the Egyptian mint was apparently submitted to the ultimate authority of that official.I base this conclusion on the names appearing on Egyptian monetary issues.Whereas the mention of the name of the caliph,or his heir,did not imply effective authority over the mints (see this question discussed in chapt.I,p.57),the insertion of the name of the inspector of coinage on coins certainly reflected his administrative relationship to the mint issuing these coins. This control seems to have been particularly effective under Jaʿfar and al-Sindī when the names of the governors are omitted on the Egyptian dinars,this state of things continues under al-ʿAbbās al-Faḍhl ibn al-Rabī.With the victory and accession of al-Māʾmūn to the caliphate the names of the Egyptian governors reappear on the coins,at first together with the names of al-Māʾmūn's 'hommes de confiance',and later alone((but

with the name of the caliph of course).The last governor whose name appears on the Egyptian coins of the pre-Tulunid period was ʿUbaydallāh b.al-Sarī (governor from A.H.206 to 211,A.D.821-826)[1]. It was this very governor who offered armed resistance to the newly appointed governor ʿAbdallāh b. Ṭāhir who was ordered by al-Maʾmūn to restore internal order in Egypt.[2] The influence of ʿAbdallāh 's successful measures aiming at the strengthening of the loyalty of Egypt towards the metropole, can be seen on Egyptian coins issued during his governorship.They show the name of the caliph only.

It is not clear whether the Egyptian mint contributed to the treasury of the caliphate during the period of the effective control exercised by the successive superintendents of the coinage.This question can be answered in the case of ʿAbdallāh ibn Ṭāhir.During the period of his governorship the whole revenue of Egypt,including,therefore, that yielded by the mint,was granted by al-Maʾmūn to ʿAbdallāh ibn Ṭāhir in recognition of his great services.[3] In this case,at least,it is certain that the treasury in Baghdād received no revenue from the Egyptian mint.

The custom of limiting personal names on Egyptian coins

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1) Zambauer,Manuel de Genealogie et de Chronologie,,p.27

2)Lane-Poole,A History of Egypt,p.36

3)see above.

to the caliph (or his heir),which was begun by ʿAbdallāh ibn Ṭāhir , was respected by his successors.Here again,it is not easy to say whether this expression of the caliph 's authority over the Egyptian coinage carried with it other than purely nominal significance. To put it differently ; whether the profits yielded by the Egyptian mint were collected by the governor,the newly appointed institution of the fieffee,or by the treasury of the caliph.When,however,in A.H.240 (A.D.854) the caliph al-Mutawakkil granted the collection of taxes,adding to it the mints all over the Empire (that is to say ; in territories still remaining under the direct authority of the caliph),to his son,the future caliph al-Muʿtazz [1], - it is safe to assume that as a result of the caliph's order the Egyptian mint remitted some part of its revenue to the credit of al-Muʿtazz.

Here is the list of personal names as they appear on available Egyptian monetary issues (dinars and dirhams) from A.H.181 to A.H.253 (A.D. 797 - 867).[2]

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1)see chapt.I,p.55

2) for its sources,see above p.62,fnt.2

year	names of the				on the
A.H.	caliph	heir to the throne	governor	inspector of coinage	coins
181	Hārūn al Rashīd	al-Amīn	Ismāʿīl b. Sāliḥ	Jaʿfar b. b.Yaḥya	Jaʿfar Amīn
182	Hārūn al Rashīd	al-Amīn	Ismāʿīl b.ʿĪsā	Jaʿfar b.Yaḥya	Jaʿfar Amīn

(During the reign of al-Amīn all the gold coins were struck in the name of that caliph, sometimes accompanied by the name of al-ʿAbbās al-Faḍl)

196	al-Amīn		ʿAbbād al-Balkhī	al-ʿAbbās	Amīn ʿAbbād
197	al-Amīn		ʿAbbād al-Balkhī	al-ʿAbbās	Amīn ʿAbbād
198	al-Māʾmūn		al-ʿAbbās b.Mūsā		al-ʿAbbās
198	al-Māʾmūn		al-Muṭṭalib		al-Muṭṭalib
198	al-Māʾmūn		al-Muṭṭalib	al-Faḍl, dhū al Riyasatayn [1]	al-Māʾmūn al-Muṭṭalib
200	al-Māʾmūn		al-Sarī	Ṭāhir dhū al Yaminayn	al-Māʾmūn al-Sarī
200	al-Māʾmūn		Sulaymān b.Ghālib	Ṭāhir dhū al Yaminayn	al-Māʾmūn Sulaymān
202	al-Māʾmūn		al-Sarī	Ṭāhir dhū al Yaminayn	al-Māʾmūn al-Sarī
203	al-Māʾmūn		al-Sarī	Ṭāhir dhū al Yaminayn	al-Māʾmūn al-Sarī

1) For the status of Dhū al-Riyasatayn and Dhū al-Yaminayn, see chapt.I.p.54

year A.H.	names of the caliph	heir to the throne	governor	inspector of coinage	on the coins
204	al-Maʾmūn		al-Sarī	Ṭāhir dhū al Yaminayn	al-Maʾmūn al-Sarī
205	al-Maʾmūn		Muḥammad b.al Sarī	Ṭāhir dhū al Yaminayn	al-Maʾmūn Mmd b.al-Sarī Ṭāhir dhū al Yaminayn
206		no change			
207		no change			
208	al-Maʾmūn		ʿUbaydallāh b. Sarī	- -	al-Maʾmūn ʿUbaydallāh b. Sarī
209		no change			
210		no change			
214		no change			al-Maʾmūn only
215		no change			al-Maʾmūn only
221	al-Muʿtaṣim		Mūsā al Ḥanafī		al-Muʿtaṣim
223		no change			
224		no change			
227	al-Wāthiq		ʿAlī b. Yaḥya		al-Wāthiq
229	al-Wāthiq		ʿĪsā b. Manṣūr		al-Wāthiq
235	al-Mutawakkil		Ḥātim b. HARTHAMA		al-Mutawakkil
242	al-Mutawakkil	al Muʿtazz	Yazīd b. ʿAbdallāh		al-Mutawakkil al-Muʿtazz
250	al-Mustaʿīn		Yazīd b. ʿAbdallāh		al-Mustaʿīn
253	al-Muʿtazz		Muzāḥim b. Khaqān		al-Muʿtazz

In describing the conditions of coinage in the pre-Ṭūlūnid ʿAbbāsid Egypt I have deliberately used the term 'The Egyptian mint',avoiding thus any local specification.The reason for that is that the only geographical denominations appearing on the Egyptian issues are Miṣr or,immediately after the victory of al-Māʾmūn,al-Maghrib.Miṣr in this period referred most probably to the whole province,in the way in which al-Andalus was used for the Spanissh Umayyad issues,or Filasṭīn for the Ṭūlūnid or Fāṭimids emissions.Most probably,however,the principal dinar producing mint of Egypt was situated in Fusṭāṭ,the capital of the province[1].Although the policy of exploitation applied by successive governors had proved disastrous in the long run for the economic stability of the country,it never really stopped the production of copper coinage by other,formerly so active centres.I cannot imagine for example the big commercial town of Alexandria without a mint of its own,although the available numismatic material from that mint originates from a much later period.

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1) Conclusions concerning this question cannot be arrived at without some new textual evidence.

Aḥmad ibn Ṭūlūn (A.D.868-884), the founder of the first practically independent Muslim dynasty in Egypt, who by his efficient administration transformed Egypt into a well organised and prosperous country, did not neglect the problem of his coinage. When by a happy circumstance he got hold of a hidden treasure containing a hoard of Byzantine coins[1], Aḥmad not only appreciated their high standard, but he personally sought to improve the standard of his own dinars. Due to his interest in the production of the mint the dinars which according to Maqrīzī[2] were known by the name of Aḥmadī, reached the official standard set by al-Sindī, the superintendent of the coinage of the caliph.[3] Judging by the last information the standard of the pre-Ṭūlūnid Egyptian dinars was inferior to that established at the mint of Baghdād.

It is quite obvious that this improvement of the standard of the coins struck by the Ṭūlūnid mint could only be a result of general economic prosperity which Egypt enjoyed under the first Ṭūlūnid rulers. All Egyptian issues (gold and silver as well) which continued to be struck in one and the same mint, bear the name Miṣr as a provincial specification. Any requirements, caused by the revival of trade activities, were probably

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1) Al-Balawī, Sīrat Aḥmad ibn Ṭūlūn, p.195-6.

2) Mq., Shudh., Mayer, p.11

3) Ibn al-Dayya ‌, ed. Vollers, p.34

covered by several mints in Syria.

Aḥmad ibn Ṭūlūn not only saw to the quality of his coins but also decided about the formulas on his coinage.When his relations with al-Muwaffaq,the practical ruler of the caliphate,came to a standstill,Aḥmad neither hesitated to,nor felt restrained from removing the name of that enemy from the official coinage.[1] The maintaining of the name of the caliph al-Muʿtamid resulted of course,from the line of policy of ibn Ṭūlūn,who was always keen to pose as a real friend and supporter of the weak and powerless suzerain.

With the collapse of the Ṭūlūnid dynasty and the reduction of Egypt to the status of a province,Baghdād succeeded to secure enough control over the Egyptian mint so as to prevent any manifestation of separatist feelings on its monetary issues.

When under the powerful al-Ikhshīd (A.D.935-946),who used to consider himself as heir to the Ṭūlūnid traditions, the relations between Egypt and Baghdād became strained once again,the Egyptian mint passed under the exclusive authority of that ruler.His name appears on coins (alongside with that of the caliph)[2].And it is to him also that the master of the mint appeals in order to receive advice about the standard of

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1)Lavoix,Cat.des Monnaies Musulmanes de la Bibl.Nationale,ii. p.3

2)ibid.,ii.,p.21

Egyptian dinars.[1]

The real revival of the Egyptian minting production took place under the Fatimid dynasty. The establishment of the capital of the Shi ite caliphate in Egypt (A.D.969) transformed that country from a province into a their centre of the most powerful contemporary state. The commercial relations with Europe, into which the Fatimids had already entered during their stay in North Africa proved now to the benefit of the Egyptian trade[2], especially as the traffic through Persia and Irak was thwarthed by political uncertainty. To exploite fully these propitious economic circumstances, the mints of the new rulers of Egypt had to produce coins satsfactory both in quantity and in quality. The former to satisfy the needs of the markets, and the latter to compete successfully with the issues of other states, especially with those issued by the ʿAbbāsid mints.

The competition with the ʿAbbāsid issues possessed also another than purely economic character. High quality coins bearing Fāṭimid legends must have constituted an important weapon of propaganda. The Fāṭimids seem to have adopted this method of propaganda at a very early stage of their career. Thus for example they managed to issue the Egptian dinars on their own behalf even before they conquered that country.[3] Whether the

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1) Ibn Saʿīd, Kitab al-Maghrib, p.31

2) Heyd, Histoire du Commerce du Levant, pp.98 ff.

3) Miles, Fāṭimid Coins, p.50

coins in question were struck by other mints, or by the very Egyptian mint during the chaos of the last days of the Ikhshīdids, still remains to be answered.[1] The culminating point of this kind of propaganda was certainly the famous Basāsīrī incident (A.D.1058). It seems also that Syrian mints played a particular part in this sort of minting production. Even minor localities like Tiberias,[2] or Accre[3] possessed mints of their own which issued coins in the name of the Fāṭimid rulers, stressing the extent of their domination and emanating Eastwards the pro-shīʿite propaganda.

The great number of the Syrian minting centres caused that the number of Egyptian mints remained unchanged at first, despite the increased demand. Although Maqrīzī says[4] that al-Jawhar o p e n e d a mint أمر جوهر بفتح دار الضرب, I think that it should be understood as the reopening of the old mint, which had been closed during the change of power. It is true that there are coins dating from a period prior to the reign of al-Āmir, which bear the mint names such as al-Qāhira al-Maḥrūsa, or al-Muʿizziya,[5] but I consider them to be special issues of the old Egyptian mint. During the period of the Fāṭimids the

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1) cf. Introduction, p.9

2), 3) Miles, Fāṭimid Coins, p.50

4) Mq., Ittiʿaz, p.76

5) Miles, Fāṭimid Coins, p.50-51

old term Misr lost its provincial character and acquired a more specified meaning, that of the mint of the metropolis.

The currency of the Fāṭimid Egypt consisted of gold, silver and copper issues, the respective exchange rates were fixed by the authority of the caliph. Monetary reforms were introduced by means of vigorous measures. Abrogated issues were to be delivered to the mint which was thus supplied with necessary stocks, while taxes were only accepted if paid in the reformed currency.1)

Although the Fāṭimid issues of the Egyptian mint were struck exclusively in the name of the caliphs (except for a short period of the Interregnum of A.H.525-526 - A.D.1131) when the name of the vizir was added to that of al-Muntaẓar[2], the mints themselves did not remain under the direct authority of the caliph. It was the qāḍī al-qudā who was entrusted with the responsibility for the correct production of the mint[3].

As long as the Fāṭimid caliphs exercised an effective control over their provinces the output of the Egyptian mint could be supplemented by the issues of provincial mints. The eleventh century A.D., however, witnessed a rapid shrinking of the Fatimid state. After the withdrawal of the Fāṭimids from

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1) Mq., Shudh,, Mayer, p.11

2) Lane-Poole, Cat. of Oriental Coins in the B.M., iv. p.55-6

3) Al-Kindī, Kitāb al-Umarā, pp.562, 575, 589, 597. Also al-Qalqashandī in Anastase-Marie, Nuqūd al-Arabiya, p.116

Syria, it was plunged into a state of political chaos and uncertainty from which the Saljūqs and the Franks were to emerge as the chief rivals for the Fāṭimid heritage. In consequence the flow of trade was diverted from Syria to Egypt, also the successive loss of various Syrian mints must have created the problem of raising the minting production in Egypt itself. Already in the first half of the 11 th century A.D. another mint begins to operate in Alexandria.[1] Of the Syrian mints, Aleppo, Damascus, Ramla and Tiberias fall into the hands of the Saljūqs. In consequence of the Frankish invasion the mints of Tripoli (the latest Fāṭimid available coin dates from A.H.495), of Accre (A.H.495), of Ascalon (A.H.510), Ayla (A.H.514), Tyre (A.H.516) interrupt their operations on behalf of the Fāṭimids. But in their place a new mint, that of Qūs, is established in Egypt (the available coins date from A.H.517, 518, 519)[2], and finally a mint is erected in Cairo itself in A.H.516.[3]

Hitherto Cairo, which under the efficient administration of Badr al-Jamalī had been the object of great urban development[4], possessed no mint of its own. Occasional issues with its monogram were probably struck in Fusṭāṭ.[5] In A.H.514 the

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1) Miles, Fāṭimid Coins, p.50

2) For all these dates see ibid., pp.50, 51

3) Mq., Descr. de l'Egypte, de Sacy, pp.75-77

4) EI, article on Cairo, i, 2nd part, p.822

5) Miles, Fāṭimid Coins, p.50

caliph al-Āmir ordered an investigation of the problems of the minting production[5]. As a result of this inquiry al-Ajall, the vizir of the caliph, ordered the construction of the mint in Shawwāl A.H.516,[2] whose issues surpassed the standard of all contemporary currencies down to the reign of al-Kāmil.[3] This mint was situated in the vicinity of the store of the butchers, and was called Dār al-Āmiriya, after the name of the caliph. The place indicated by Maqrizi corresponds with modern Ṣanadiqiya Street, not far from the mosque al-Azhar. The mint remained in that place until the reign of Saladin[4].

Altogether the number of the Egyptian mints, issuing gold currency, amounted under the Fāṭimid caliph al-Āmir to four, though within the very reign of this ruler the production of the mint in Qūṣ[5] was brought to a standstill[6]. With the subsequent destruction of Fusṭāṭ in A.H.564 (A.D.1168)[7], its mint falls victim to general devastation, so that the number of mints taken over by Saladin was reduced to two only, Cairo and Alexandria.

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1) IB, fo.2 v.

2) Mq., Description de l'Egypte, de Sacy, p.76

3) IB, fo 2v.

4) Wiet, Matériaux pour Un Corpus., Egypte, lii, pp.183-4

5) For the importance of Qūṣ see Fischel, Über die Gruppe der Karīmī-Kaufleute, p.74

6) Last available coin dates from A.H.519, cf. Miles, Fāṭ. Coins, p.51

7) Lane-Poole, A History of Egypt, p.184

The minting production under Saladin,the founder of the Ayyūbid dynasty,constituted one of the acutest problems of his financial policy.With high quality cash money he could buy arms from European merchants,his regular suppliers[1].With these arms he could launch military operations aiming at the expulsion of the Franks.The return of security and propitious conditions for internal trade activities,the main contributor to the Egyptian treasury,depended on the success of these operations.

The special care with which Saladin's administration surrounded the minting production did not,however,result in the increase of Egytian mints.One reason for that was that in extending his authority over the greatest part of Syria, Saladin was able to undertake minting production on his own behalf in Damascus,Hama and Aleppo[2].Secondly a limited number of mints rendered the control over these institutions more efficient.Thus the mints in Saladin's Egypt were limited to two; that of Cairo and Alexandria.[3] While Ibn Mammātī says only that the mints were in al-Qāhira al-Maḥrūsa[4],Maqrīzī goes as far as to give its exact position.According to him Saladin

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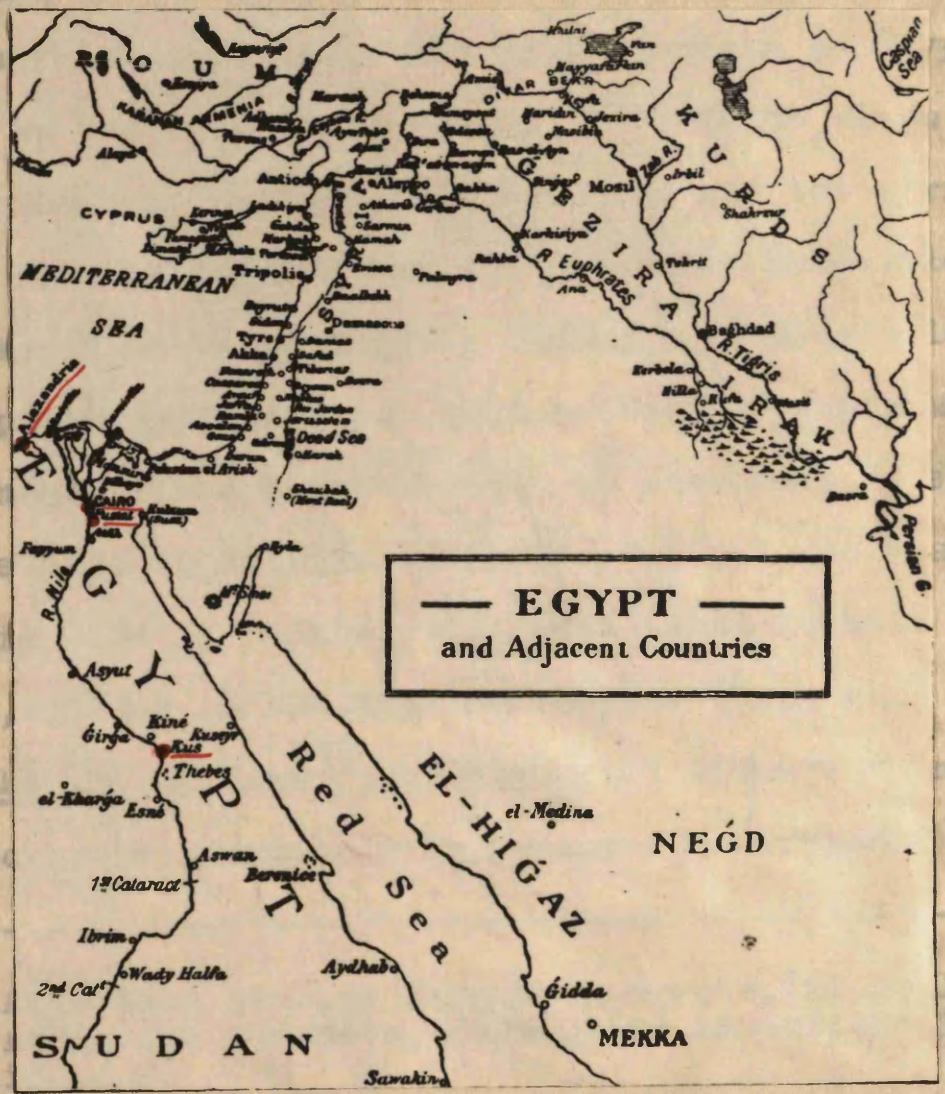
1)Heyd,Histoire du Commerce,i.p.386

2)Lane-Poole,Cat.of Oriental Coins in the B.M.,iv.p.64

3)Ibn Mammātī,Kitāb Qawānīn,p.331

4)ibid.,p.331

EGYPTIAN MINTS OF AL-ĀMIR (A.H.517)



Saladin transferred the mint from the Sūq al-Qashshāshīn to a building close to the Iwān Kabīr,which place corresponds with the hall of ablutions of the mosque of Ḥusayn of to-day.[1]

Saladin did not fail to stress on his coinage the restored allegiance of Egypt to the ʿAbbāsid caliphate.This,of course, had no bearing whatever on the administrative status of the Egyptian mints.For,by then,they represented a fully developed link in the elaborate administrative organisation of the Ayyūbids.This position of the Ayyūbid mints in Egypt is illustrated on the example of the mint of Cairo,which is discussed in the next part of the thesis.So are the various issues of this mint.It is nevertheless necessary to mention here that the armament drive of Saladin caused a considerable drain on the Egyptian ressources of gold,so that,to quote Maqrīzī's witty phrase ' the dinars became so rare,that to speak of them,was like to mention in front of a jealous husband the name of his wife'.[2] Although Saladin tried to help the internal market ,issuing a new type of dirhams which came to be known as the Nāṣirī dirhams[3],the financial situation inherited by his successors certainly represented a difficult problem.

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1)Wiet,Matériaux pour un Corpus,ii.Egypte,lii,pp.183-4 .For Iwan Kabir see Casanova,Description Historique,MIFAO,(1920) iv.p.iii

2)Mq.,Shudh.,Mayer,p.12

3)ibid.,p.12

When al-Kāmil ascended to the Egyptian throne in A.H. 615 (A.D.1218) he had two mints at his disposal.Though at a certain time he was compelled to open two additional mints, in the citadel and in Misr,in order to supplement the needs of coinage demand,his chief and permanent mints remained Alexandria and Cairo.It is the mint of Cairo which constitutes the subject of the next part of the present inquiry.

PART TWO

PART TWO

Chapter III

THE REIGN OF AL-KĀMIL

Before embarking upon a detailed investigation of the organisation of al-Kāmil's mint it is necessary to outline some major political and economic events of his reign.

Al-Malik al-Kāmil ibn al-ʿĀdil, the fourth Ayyūbid ruler of Egypt, succeeded to the Egyptian throne in A.H.615 (A.D.1218). This date, however, marks only the formal proclamation of al-Kāmil as sultan, because, in reality, he had been ruling Egypt for several years before the death of his father. Engaged in his efforts to maintain the supremacy of Egypt over other branches of the Ayyūbid house, al-ʿĀdil had to rely on al-Kāmil for watching the internal Egyptian policy. When, for instance, in A.H. 609 (A.D.1212) al-ʿĀdil set out for Syria, he left behind al-Kāmil vested with full powers, including financial administration of the country [1]. Thus, by the time of his formal accession to the throne al-Kāmil had already been fully acquainted with the intricacies of the Egyptian policy, and well aware of the finan-

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1) Blochet, Histoire d'Egypte de Makrizi, p.306

cial advantages,which the appropriate administration of the country was capable to produce.

The statesmanlike qualities of the new ruler were put to trial by the political circumstances accompanying his enthronement.A strong expeditionary force of the Crusaders under the leadership of John of Brienne were successfully besieging Damietta,the fall of his fortress was to provide the Franks with a convenient base from which to launch a thrust against the capital of Egypt.[2] Despite this extremely difficult situation imperilling the fate of the Ayyūbid Egypt, al-Kāmil succeeded in emerging as the ultimate winner,dictating his terms to the defeated Frankish adventurers.[3]

But the threat on the part of the Crusaders constituted only one problem of al-Kāmil ' s foreign policy.The intrigues of the Ayyūbid princes in Syria and the growing power of the Saljūqid sultan in Qonia,were constantly attracting the attention of the Egyptian ruler.[3] The last major problem arose from the invasion of the Mongols,whose only obstacle on their way to the Ayyūbid area,after the fall of the Khwarizmian kingdom,was the caliphate of Baghdād,though more symbolic than effective in its power.

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1)Grousset,Histoire des Croisades,ii.p.171

2)Lane-Poole, A History of Egypt,pp.221-224.

3) ibid., pp.228-229

To cope with all the problems arising from his foreign policy al-Kāmil had to rely both,on diplomatic and military activities.The A.D. 13-th century international politics reached a stage when religious considerations could no longer prevent partners of different creeds from negotiating treaties based on sober appreciation of mutual interests.This aspect of political maturity of al-Kāmil,which revealed itself as early as during the fierce struggles against the forces of John of Brienne,reached its climax in the treaty concluded in A.D.1229 with emperor Frederick II. [1)]

That Egypt preserved her supreme position during the twenty years of al-Kāmil 's reign was mainly due,however,to the fact that he supported his policy with strong military measures.Either by sending his armed forces to help political partners,as he did in the case of caliph al-Mustanṣir (A.D.1238)[2)] in a far-sighted anticipation of the Mongol onslaught,or by means of personal,drastic,military interventions which kept him away from Egypt for the greatest part of the last 10 years of his life.

Whether diplomatic negotiations or military actions,both these methods must have absorbed a considerable part of the Egyptian income.I think it necessary to emphasize here the finan-

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1)Lane-Poole,A History of Egypt,p.227

2)Blochet,Histoire d'Egypte de Makrizi,p.418

cial aspect of the armed conflicts under consideration. While a considerable proportion of the Crusaders could well be recruited and attracted by the prospect of looting of riches accumulated in Oriental lands[1], the forces of Oriental rulers consisted in the 13-th century A.D. of professional soldiers with fixed scales of salaries. Although the system of Iqṭāʿ, which reached its full development under the Mamlūks, helped the Ayyūbid rulers to reduce their military expenditure, the costs of warfare were certainly enormous. If the construction of a single tower and the digging of a ditch in Damietta cost 70.000 dinars [2], what an immense sum must have been spent on the conversion of al-Manṣūra into a military stronghold, and on the erecting of other obstacles protecting Cairo from the Crusaders. The sum paid by al-Kāmil to his army before setting out on the expedition of A.H.632 (A.D.1235) amounted to 3000 dinars (paid in dirhams) per 100 men. The amir of 100 received 1000 dinars and every soldier 20 dinars. Special troops, like the personal guard, received even more.[3] In A.H. 634 (A.D.1237) al-Kāmil allotted 200.000 dinars for the raising of an expeditionary corps for Baghdād; this recruited force was to be joined by 10.000 men drawn from the standing Syro-Egyptian

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1) cf. the sermon of the Pope in Clermont, in Laffan, Select documents, i.p.55-6

2) Blochet, Histoire d'Egypte de Makrizi, p.320

3) ibid., p.406

army of the sultan. Considering that al-Kāmil undertook five major expeditions (A.D.1227 -9, 1231 -2, 1233-4 , 1235 -6, 1237-8,)[1], that he had to back his political negotiations with lavish gifts, and that he was very generous to various persons seeking political asylum in Egypt [2], one can conceive the huge sums of money spent on al-Kāmil 's policy.

But foreign policy was not the only aspect of al-Kāmil 's activities. He saw to the inner development of the country. Improving the system of irrigation, building colleges, like the Dār al-Kāmiliya for instance, or completing the Cairo citadel, - formed, among others, the long list of state expenditures.[3]

It is clear that the sound administration of Egypt's finances lay at the root of al-Kāmil's successes. He probably persevered in the financial policy of his father, al-ʿĀdil, which must have been very successful, since a part of his treasure, seized at his death by his son al-Muʿazzam, amounted to 700000 Egyptian dinars, not to mention large quantities of silver.[4] Immediately after the accession to the throne al-Kāmil appealed to the retired Ṣafī al-Dīn ʿAbdallāh ibn Shākir[5] who

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1) Blochet, Histoire d'Egypte de Makrizi, pp.363 - 416.

2) ibid., p.378

3) Lane-Poole, A History of Egypt, p.230

4) Blochet, Histoire d'Egypte de Makrizi, p.319

5) ibid., p.322

had exhibited his financial abilities during the reign of al-ʿĀdil. Al-Kāmil appointed him to the post of vizir with the task of raising funds for the war against the Crusaders. After the death of Ṣafī al-Dīn in A.D. 1226 al-Kāmil seems to have trusted no one and seen to the finances of the state personally.[1] From A.D. 1228 onwards the greatest part of al-Kāmil's time was spent on campaigns abroad, so that Egypt remained under direct authority of his son al-Malik al-Ṣāliḥ who had amir Fakhr al-Dīn Yūsūf as his financial adviser.[2] But even then Egypt's economic development continued to absorb the sultan's attention, as revealed by some financial measures undertaken by him on occasional short stays in the capital.

Al-Kāmil was fortunate in the fact that Egypt during his reign never suffered major famines. Only four times (in A.D. 1220, 1225, 1232, 1233)[3] the low Nile caused a shortage of food and a rise in prices. Apart from the income yielded by conventional sources, al-Kāmil also obtained additional sums by having recourse to financial speculations. His famous monetary reform of A.H. 622-3 (A.D. 1225-6) is the most typical example of his financial shrewdness. The blindness of Ṣafī al-Dīn ibn Shākir and his growing feebleness left al-Kāmil alone[4]

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1) Blochet, Histoire d'Egypte de Makrizi, p. 353

2) ibid., p. 364

3) ibid., pp. 341, 361, 404

4) ibid., p. 424

to cope with an economic crisis arising from the low Nile in A.D.1225 which produced a rise of the cost of living and the consequent devaluation of dirhams in relation to dinars.[1] Besides insisting upon a rigorous collection of taxes,including those in arears[2],the sultan began the issue of a new series of dirhams,the so-called mustadīra dirhams,in order to stop the shortage of the old dirhams.This event took place in the last days of November A.D.1225. [3] For that purpose also,al-Kāmil temporarily opened two additional mints,one in Miṣr (a fact confirmed by the existence of coins from that mint and of the corresponding date[4]),and the other in the citadel itself. [5] With the issue of the new dirhams,the exchange rate which had already amounted to 44.5 dirhams per 1 dinar of gold, was fixed by the sultan at 37 new or 42 old dirhams against 1 gold dinar.Subsequently the population was compelled to exchange the old dirhams for dinars at the rate of 45 old dirhams against 1 gold-dinar.Finally,the government ordered the compulsory delivery of dinars in question at the rate of 35 new dirhams,obtaining by this measure a net gain to the treasu-

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1)Blochet,Histoire d'Egypte de Makrizi,p.362

2)ibid.,p.361

3)Mq.,Shudh.,Mayer,p.12

4)Lane-Poole,Cat. of Oriental Coins in the B.M.,iv.p.104

5)Blochet,Histoire d'Egypte de Makrizi,p.362,ftn.

ry.[1]

The financial reforms of sultan al-Kāmil bring into prominence the problem of his mints. It was the first half of his reign, between the A.D. 1218 -28 that was particularly significant for the minting production. It was in the years A.D. 1225 and 1226 that his famous reform of dirhams took place. Before that, al-Kāmil improved the standard of dinars.[2] In A.D.1225 -6 two temporary mints[3] were opened to supplement the production of the Cairo and that of the Alexandrian mints.

The inquiry into the organisation and operations of the Cairo mint during these early years of al-Kāmil's reign is the subject of my thesis.

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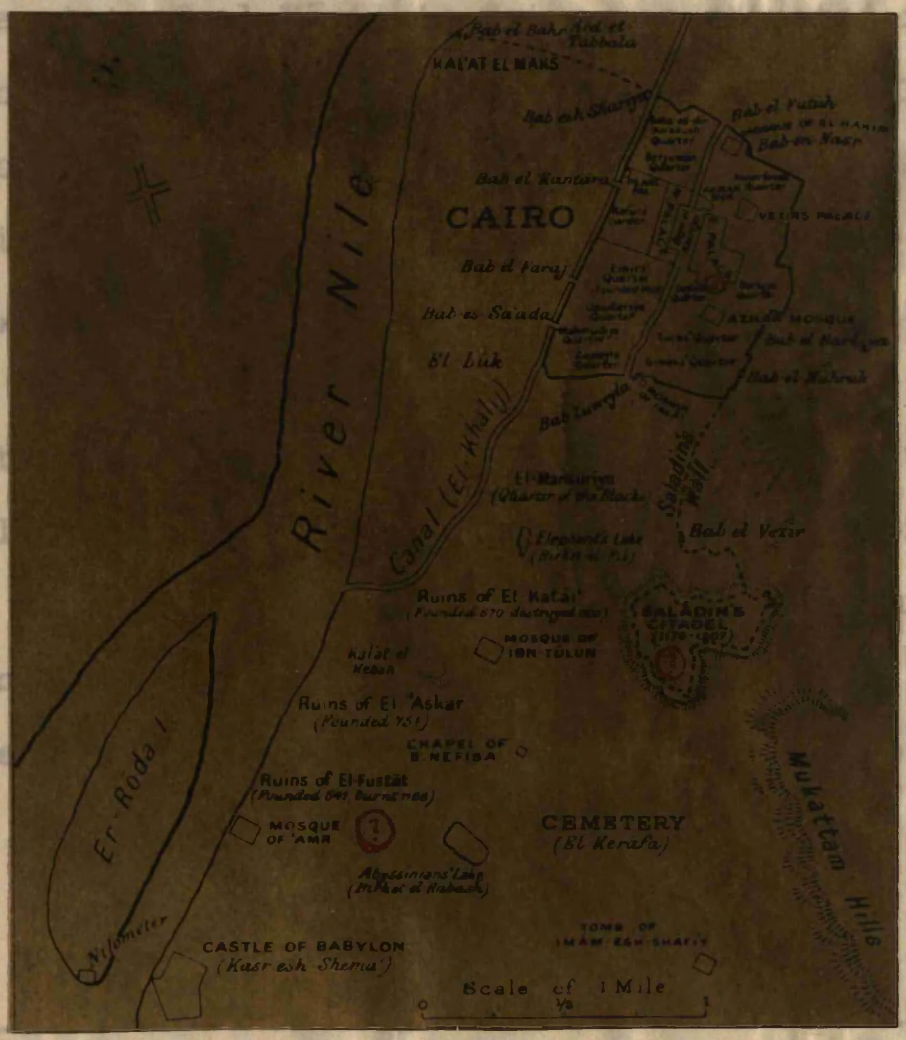
1)Blochet, Histoire d'Egypte de Makrizi, p.362

2)IB, fo 2v

3)Blochet, Histoire d'Egypte de Makrizi, p.362, ftn

THE MINTS OF THE CAPITAL UNDER AL-KĀMIL (A.D.1225)



Chapter IV

L O C A T I O N O F T H E M I N T

The mint of al-Kāmil in Cairo was situated in the place to which it had been transferred by Saladin.[1] The first mint in Cairo itself was erected in A.H. 516 (A.D.1122) [2] by the Fāṭimid caliph al-Āmir.He built it close to the Sūq al-Qashāshīn,which corresponds with the Ṣanadiqiya Street of to-day. [3] When Saladin seized power in Egypt he transferred the mint to a building in the vicinity of the Iwān Kabīr,where it still remained in Maqrīzī's time.(A.D.1364-1422).This new site is identical with the external hall of ablutions of the Ḥasanayn mosque.[4]

The appended plan,taken from Ravaisse,[5] shows the position of the two mints in Medieval Cairo.

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1)Wiet,Matériaux pour un Corpus.,Egypte,lii,pp.183-4

2)Mq.,Description de l'Egypte,de Sacy,p.76

3)Wiet,as above,p.183

4)ibid.,p.184

5)Ravaisse,Essai.,ii,p.92

The mint of al-Āmir

The mint of al-Kāmil

Fig. 29. Plan restitutif du quartier des palais fatimides (d'après Ravaisse).

Chapter V

ADMINISTRATIVE SIGNIFICANCE OF THE MINT

" Once the mint used to yield a great income to the sultān." These words of Maqrīzī[1], confirmed by the information of ibn Mammātī mentioning Dār al-Ḍarb on the list of Saladin 's state revenue[2], refer probably to the profits derived from the principal, original function of the mint, that of producing monetary issues. The investigation of the nature of this function constitutes, in fact, the main topic of the remaining chapters.

There is, however, in the text of Ibn Baᶜra an allusion to another aspect of the activities of the Cairo mint. He calls this mint the most abundant of the treauries (buyūt al-māl).[3] To judge by his words the treasury of al-Kāmil had several depots, the largest one being established in the mint of Cairo.

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1) Mq., Description de l'Egypte, de Sacy, p.75

2) Ibn Mammātī, Kitāb Qawānīn, p.331

3) IB, fo 1v

Large quantities of precious raw material,stored in the mint, contributed to the importance of this institution as a treasury depot.

It also seems that there was a further reason for stressing the special position of the Cairo mint.I think that the mint in question was also a place of exchange of money at the time of al-Kāmil's monetary reform.I base my assumption on an analogy drawn from an incident from the reign of the Fāṭimid caliph al-Ḥākim (A.D.996 - 1021).When this ruler undertook his monetary reform,the population was ordered to hand over the abrogated currency to the mint.[1] When the inhabitants of Cairo were on several occasions ordered by al-Kāmil to exchange the money in their possession,they did it probably in a similar fashion.

The mint of Cairo performed,thus,a double function in the fiscal administration of al-Kāmil.While it was primarily concerned with the production of coinage,it also served on such occasions as an anxillary treasury.

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1)Mq.,Shudh.,Mayer,pp.11-12

Chapter VI

THE SYSTEM OF CONTROL

It is quite obvious that the operations of the mint were kept in secret in order to safeguard the royal monopoly.For that purpose an efficient system of control must have been in existence securing the proper execution of the sultan's decisions with regard to currency,preventing the leakage of secrets and ensuring that profits derived from minting operations were duly delivered to the dīwān.

Control of the mint in all Islamic lands was the prerogative of the sultan himself.Some rulers took a personal interest in the working of their mints.Al-Āmir (A.D.1101-1130) is said to have bordered an investigation in the operations of his mint[1].Al-Kāmil insisted upon the improvement of his dinars.[2] In the Mamlūk period the mints were farmed out, but decisions concerning monetary issues continued to be made by the sultan.[3]

Unfortunately,Ibn Baʿra,who was chiefly interested in the

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1)IB,fo 2v

2) as above

3)Mq.,Shudh.,Mayer,p.13

technological aspect of production,does not refer precisely to any official exercising the duty of supervision on behalf of the sultan or of the dīwān.In Fāṭimid times it was the qāḍī or the chief qadi (qāḍī al-quḍā)[1] who was normally charged by the caliph with this task.[2] In describing the process of striking dinars in Saladin's mint Ibn Mammātī states that their standard had to be approved by a religious official (وأجازه النايب فى الحكم)[3] [4].Ibn Mammātī wrote this passage in A.H.587 (A.D.1191) that is to say only 20 years after the abolishment of the Fāṭimid caliphate.Ibn Baʿra,whose treatise was written 50 years after the end of the Fāṭimid dynasty, says in a similar context only : فقد جازت [5] without

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1)see above,chapt.II,p.73,ftn.3

2)Similar duties were fulfilled in the first half of the 11 th century by a qāḍī in Baghdad.cf.Mez,Die Renaissance des Islam,p.213

3)Ibn Mammātī,Kitāb Qawānīn,p.332

4)On the other hand Abū Shāma (Livre des Deux Jardins,Recueil des Historiens,iv.,p.237-8) that when Saladin conquered Ḥalāb in A.H. 578 (A.D.1182),he submitted the mint of that town to the authority of the head of the dīwān.

5)IB,fo 5v

explicitly stating who had to approve of the standard.He says, however,that the process of extracting silver from the furnaces could only be performed in the presence of al-ʿudūl .[1] These people did not belong to the staff of the mint,but there presence was necessary.Whereas Ḍātimid mints figure on the lists of institutions submitted to the authority of the qāḍī[2], but they do not appear on a list dating from the time of sultan Baybars (A.D.1260 - 77).[3] In speaking of the administration of Tripoli,Qalqashandī mentions the office of shadd dār al-ḍarb, and that of shāhid dār al-ḍarb,and says that the issues of the mint were to be verified by the nāẓir.[4] None of these was a religious official. In the time of sultan Barqūq (A.D.1382 - 1399) it was his ustadār Maḥmūd who played an important part in the administration of the mints.[5]

In the light of the above evidence it seems that the system of supervision of the mints had undergone some changes under the Ayyūbids,when religious bodies, vested with that task, were gradually replaced by lay functionaries.In the time of Ibn Baʿra,however,the mint was still controlled by reli-

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1)IDB,fo 9 r

2)al-Qalqashandī,Ṣubḥ al-Aʿsha,x.pp.384,385,388

3)Muhyi al-Dīn,Sīrat.,Ms,BM Add.23,331.fo20

4)Demombynes,Las Syrie,p.225,also Björkman,Beiträge,p.164

5)Mq.,in Sauvaire,Matér.,(1880),p.269

gious officials.It is also very likely that in the early years of his reign al-Kāmil relied on the person of his vizir Ṣafī al-Dīn for the administration of his mints.[1]

The next problem that presents itself is whether or not the mint under consideration was farmed out as a fief.Here again the manuscript fails to give a definite answer.It provides,nevertheless,some hints which make it possible to reach an interesting conclusion.The key to the solution lies in the nature of financial obligations which the mint had to meet.According to information given by Ibn Mammātī the levy of the diwan from the mint was based on a fixed percentage deducted from coins produced in that institution.[2] The income yielded by the mint to the diwan did not,therefore,represent a stable sum,but varied in accordance with the quantities of bullion passing through the mint.Thus the mints of Saladin were not farmed out,because farming involved payment of a fixed sum at agreed periods,independent from the real proceeds.Seventy five years later,in the second year of Baybars'reign (A.H.662 -A.D.1263) the mint was already farmed out.Muhyi al-Din,the chronicler of Baybars not only mentions the term ضمّان دار الضرب (farmer of the mint) but also specifies the sum he had to pay.[3] This information is repeated by Maqrīzī[4] who,on another

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1)see above chapt.III,p.85

2)Ibn Mammātī,Kitāb Qawānīn,pp.332-3

3)Muhyi al-Dīn,Sīrat,Ms.,B.M.Add.23,331,fo 76

4)Mq.,Sulūk,ed.Ziyada,i.p.508

occasion,states that the Cairo mint was farmed out by sultan Barqūq.[1] As for Ibn ʿBa ra and the obligations of the mint described by him,he mentions also a fixed percentage levied[2] from the coined material,and warns that any dishonesty, in the course of production, would cause inevitable loss to the dīwān[3]. The references of Ibn ʿBa ra incline me to advance the following conclusions ;firstly,that the Cairo mint did not constitute a fief until A.D.1225,at least,and secondly,that the farming out of the Cairo mint must have taken place between the years A.D. 1225 and 1262.

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1)Mq.,Traité des Famines,in Sauvaire,Matér.,(1880),p.262

2)IB,fo 4v

3)IB,fo 8v

Chapter VII

THE STAFF OF THE MINT

Apart from dedicating his treatise to the mutawallī [1] (which is a general term meaning literally 'man in charge'), Ibn Baʿra does not mention who was the head of the mint, or what was the nature of this office. He is more explicit, however, about the duties of other employees of the mint. These can be divided into two categories, the clerks and the manual workers. Among the former are the mushārif and the shāhid. Among the latter the naqqāsh, and the sabbākūna and darrābūna with the muqaddam as their foreman.

The mushārif used to perform the duties of a manager. He was responsible for the precious metal stored in the mint, and for instruments and measures used for minting operations. He also controlled accounts and book-keeping (8v) [2]

The task of the shāhid consisted in assisting the technical operations and checking them against the accounts (8v).

A special position among the manual workers was occupied by the naqqāsh (engraver of dies). To stress his official sta-

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1) IB, fo 1v

2) The figures in brackets refer to fos in Ibn Baʿra 's manuscript.

tus he bore the imprint of the official stamp on his hand[1]. To improve his skill, his professional activities were restricted to engraving only. The engraving of the dies was done in seclusion (8v).

The muqaddam tested the alloys of the raw material and adjusted them to the official standard. In order to prevent forgeries he had to test personally every quantity of raw-material delivered to the mint, and to seal the furnaces used for the tests. If a mistake occurred in the proportion of the components of the alloy, the muqaddam was held responsible for the loss (8v, 9r, 9v).

The other members of the staff were the sabbākūna (melters) and darrābūna (minters), which two terms are often confused by Ibn Baᶜra. These were the workers who carried out the actual technical operations. (4v, 7v, 8r, 9r, 9v). Whenever a mistake was made in the course of these operations it was they who were charged with the loss incurred by the mint (9v).

The salaries of the staff of the mint did not consist of fixed wages, but depended on the profit derived from raw material delivered to the mint for conversion into coins. According to Ibn Mammātī the rate of interest, charged by the Cairo mint for the coinage of gold amounted in A.D.1191

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1) This custom was practised in early Islamic times. Already Balādhurī refers to it (Futūḥ, p.454). Cf. also chapt. I. p.46

(A.H.587), to 3%,only 0.3 % being allotted to the minters[1]. In al-Kāmil's time the sum levied on gold was raised to 5 % (4v).One should imagine that the sum collected for the benefit of the staff of the mint in question as far coinage of gold is concerned,amounted to around 0.5 %. There is no information concerning the levy imposed by al-Kāmil's mint on the mintage of silver.

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1)Ibn Mammāti,Kitāb Qawānin.,p.332

Chapter VIII

TOOLS, INSTRUMENTS, WEIGHTS AND MEASURES

In his description of various technical processes of the mint Ibn Baʿra mentions the following implements.

Furnaces

There are three types of furnaces, atūn , tannūr and kūr, used for refining,for extracting silver from the habaq and for fusing alloys necessary for casting the waraq dirhams. The atūn is quadrangular on the outside and round inside.The surface of its base is 4 square spans.The interior of this furnace is plastered with fine clay mixed with salt.On its top is a small earthenware chimney.The door of this construction, resembling that of an oven,is shut with a bolt.The bottom of the atūn,which has an earthenware fire-grate,is raised from the ground to the height of two courses of bricks.(3r ; 5r ; 5v;, 8v ; 9r). Tannūr has its bottom larger than its top,its diameter being $1\frac{1}{2}$ span.Its tall chimney is 2 cubits long.A rūbāsh (bellows) is built on top of this furnace.The tannūr has no door.(7r ; 8v ;). The qubba (cupola) is a slightly

different furnace of the tannūr type.It is small but high.It has a large door which is sealed with clay and sand in the course of the operation.In front of this door is an opening through which the smoke escapes.(7r;) An interesting feature of the furnaces of this type is their provisional character. They are erected over crucibles and brought down as soon as the required chemical results have been obtained. As for the kūr (7v ; 8r ; 8v ; 9r ;) Ibn Baʿra says only that it was used for heating crucibles.

A special kind of bellows,called al-rūbāsh,were used for intensifying the heat.(6v ; 7r ; 8r ; 8v ; 9v ;).Ibn Baʿra gives a description of the rūbāsh,which provides an adequate answer as to the precise meaning of this word.[1] He says ; 'It is a kind of bellows (minfakh) turned upside down.The wind (rīḥ) comes out of their mouth (famuhu)-min famihi) to the middle of the crucible.' (8r).

Crucibles

There are three types of crucibles ; būtaqa,fūtaqa ,and būṭa,sometimes called būṭ.While the first two were used for melting down silver alloys,(6v ; 7r ; 7v ; 8r ; 9r ; 9v), the last one was also used for adjusting the standard of gold (9r).The material of which it was made varied according to

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1) cf.,discussion on the meaning of rūbās in Levy,Maʿalim al-Qurba,p.103 ; also Wiedemann,Beiträge,xxxii.p.37

to its particular use.Thus the būṭa used for refining silver was made of slaked lime,sifted ash and a little water (6v). Another,used for the extraction of silver from the ḥabaq,is of ash mixed with water only (7r).Still another,for the same process,was made of equal amounts of slaked lime and ash (7r). A third būṭa,in the course of the same operation,is made of equal amounts of slaked lime,ash,and water (7r).The būṭa made of a compound consisting of $\frac{1}{3}$ lime and $\frac{2}{3}$ ash,was required for testing the standard of the waraq dirhams (8r).

The crucibles were removed from the furnaces with kalbatāyn ḥadīd (iron tongs) (7v).They were skimmed off with māsik ḥadīd or māsika ḥadīda (iron ladle) (7r, 9v).

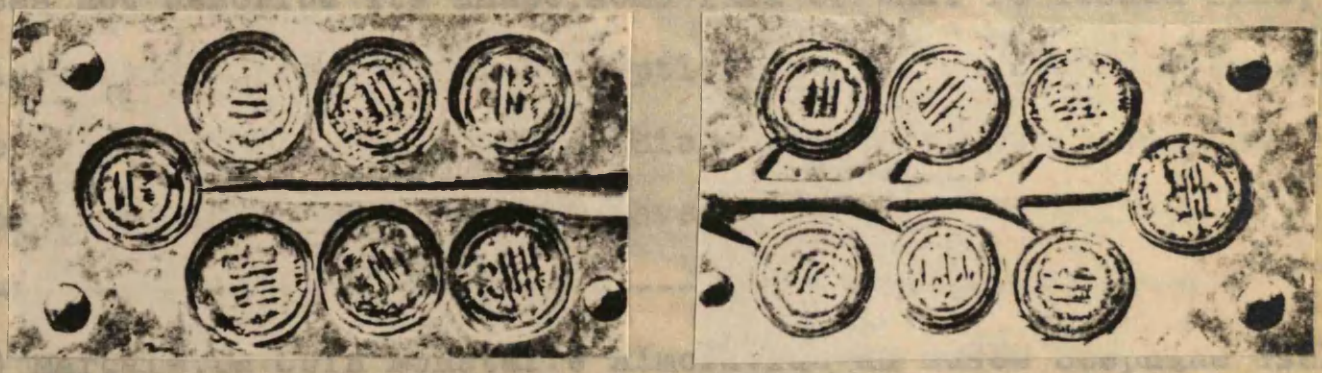
Vessels

Gold is refined and heated before polishing in aqdāḥ fakhkhār aḥmar (earthenware cups) (3v, 5r , 6r , 6v , 8v , 9r).When put into the atūn the cup was placed on libna (a brick).(5r). Qaṣriya fakhkhār (earthenware vessel) was placed under the ghirbāl (riddle) in the course of refining the gold (5v). Qidr fakhkhār (earthenware pot) (6v , 8r) and maṭr fakhkhār (6v) (earthenware vessel) were used for distilling mercury.Still another vessel,mājūr,was used in the process of extracting silver from the earthy residue (6r).The nuqra blanks were heated before polishing in the kaff ḥadīd (iron pot) (7r).Vitriol,in which the waraq flans were dipped,was boiled in the dast nuḥās (copper vessel) (8r).These blanks

were then rinsed in the dastār khashab (apparently a wooden vessel) (8r).Khūdha,a wooden cupola in the shape of a helmet (7v),used for casting the waraq flans,was placed in a jug called dann (7v).

Other Tools

Hajr al-sabk (grinding stones ?) (6r , 6v , 8v ,), a concave sdāya (an oblong stone)(4r) and fihr (roller) (4r) of the size of a hand,the two last of hard stone,are used for crushing the earthy residue.Gold test and check plates were shaped on a qālib fūladh (steel mould) (5v).Mitrāq and sandān (hammer and anvil) (6v) were used for annealing silver. Silver,of which nuqra dirhams were produced,was cast in darsal (mould ?) (6v).Gold flans were also cast in a mould but I am enable to establish its name on the basis of the existing manusctipt.Here is a Medieval Islamic mould for casting dinars found by prof.Wjatkin in Afrasiyab[1].The picture,taken from Arne ' s article, is,I think,a useful illustration in connection with the mould used in the mint of al-Kamil.



1) Arne,Funde von Gussformen für Kufische Münzen und Medaillen, Ars Islamica,iv (1937)

The gold plates were wiped on lūḥ khashab (wooden board)(5v) with a khirq ṣūf (woolen rag) (5v).Weighing was done with mīzān (balance) with two scales (kaffata al-mīzān)(5v) and ṣanja (troyweight) (7v ; 8v).

Mihakk (touchstone)(4v ;5r ; 5v) was used for assaying. A special set of 18 ʿiyārāt (touchneedles) was required for that purpose.Each touchneedle weighed 1 mithqāl.The highest quality needle consisted of 23 qirats of fine gold and 1 qirat of fiḍḍa dhahabiya.In the remaining needles the fiḍḍa dhahabiya was gradually substituted for the fine gold,so that the 18th needle contained 18 qirats fiḍḍa dhahabiya and only 4 qirats of fine gold.This standard,called ruba a was out of course.All these touchneedles were fixed into a silver form, together with the touchstone,one after another beginning with the best quality one and ending with the 'out of course ' standard (4v - 5r).

It was with a sikka (coin-die) that polished flans were stamped (5v ; 6r ; 8r ; 8v ; 9v).Although Ibn Baʿra does not describe its shape,some idea of what it looked like, might be derived from a description of the perfectly preserved die of the Almoravids.[1] This consists of two parts.The lower die,which produced the obverse,is let into a kind of

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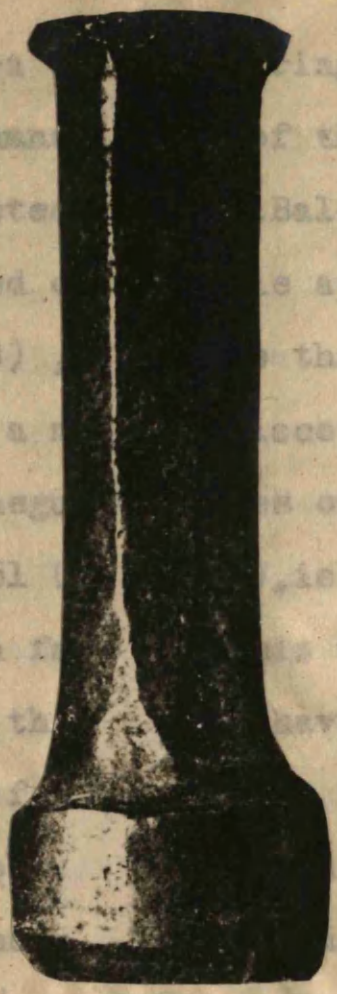
1) Marçais,Un Coin Monétaire Almoravide du Musée Stéphane Gsell, Annales de l'Institut d'Etudes Orientales,ii (1936)

small anvil.The upper,for the reverse,is at the end of a cylindrical bar.Two pegs joining the two dies prevented the flan,placed between them from sliding.It seems,however,that the sikka in al-Kāmil 's mint had no device to prevent sliding,since the coins from that mint reveal lack of correspondence between the obverse and the reverse,as far the disposition of their respective inscriptions is concerned.While it is obvious that the imprint was obtained by a blow of the hammer, it is unknown how far the blank was heated before being struck.The designing of dies represents another interesting problem.There is no doubt concerning the sikka of the Almoravids,where the engraving was carried out



directly on the steel.The idea of considering this method as having been applied for the manufacture of the Ayyūbid coin--dies has been recently rejected by prof.Balog.[1] Having thoroughly examined the preserved obverse die apparently made in Cairo in A.H.635 (A.D.1238) ,he states that it was manufactured indirectly,by means of a mould.A discovery of two small lead plates bearing the two negative faces of a dinar struck in Mah al-Kūfa (?) in A.H. 251 (A.D.865),is in Prof.Balog's view a conclusive argument in favour of his theory.These were made of so soft a metal that they cannot have been employed for stamping blanks,but only for imprinting the moulds in which the stamp-dies were cast.This was the way in which the sikka of A.H.635 is also said to have been manufactured.According to prof.Balog this method possessed many advantages.'Le travail du graveur était infiniment plus facile sur le plomb que sur le métal dur du coin en bronze même,de plus,en cas d'erreur,l'artisan n'avait qu'à effacer le tout et recommencer sur la même feuille de plomb.La présence ou l'absence de traces de moulage dépendait donc uniquement du plus ou moins de soin et d'habileté du mouleur.' [2]

I fully agree with prof.Balog that this method makes the task of a 'graveur' easier.The responsibility for the success-

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1)Balog,Nouvelles Observations sur la Technique du Monnayage, BIE,xxxiii.pp 34 ff.,from where the picture on the preceding page is borrowed.

2) ibid.,p.40

ful manufacture of dies would,in fact,have rested chiefly with the moulder.On the other hand the engraving,in soft material,of a pattern-die which was to suffice for a whole series,possibly for a whole year,would have reduced the occupation of the die-sinker to a rather easy,occasional,or to use a modern term,part-time job.This conception of the die-sinkers profession,implied in the theory of prof.Balog,is incompatible with the information given by Ibn Baʿra.The latter emphatically stresses the peculiar significance of that artisan's task. 'A naqqāsh (engraver,sculptor,in this case die-sinker) must be engaged exclusively in engraving (naqasha) dies.This increases his skill and dexterity and makes the dies difficult to imitate.The workers must have no access to a new die.The dies are stored by the musharif. ' [1)]

Ibn Baʿra 's information is,in my opinion,a convincing argument for challenging prof.Balog's view with reference to dies manufactured in al-Kāmil 's mints.It is not necessary to assume that the process outlined by prof.Balog represented the usual one employed in the mints,as we can by no mints be sure that the isolated examples,on which he bases his conclusion, are genuine.Should they be proved to be forger's tools,his argument would be automatically void.Against this theory we

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1) IB,fo 8v

have an unequivocal statement of Ibn Baʿra, whose expert knowledge could not be questioned, that dies were engraved not cast.

Weights and Measures

The weight and measure units appearing in the treatise of Ibn Baʿra belong to three categories. Ḥabba (5v ; 6r ; 7v), qīrāṭ (3v ; 4v ; 5r ; 7r ; 9r), dirham (6v ; 7r ; 7v ; 8r), and mithqāl are the troy weights. Kayl (5r) and wayba (8r), raṭl (6r ; 6v ; 7r ; 8r) and qinṭār (7r) belong to measures of capacity. Shabr (5v ; 7r) and dhiraʿ (cubit, ell) (7r) are the long measures.

While the manuscript does not provide any hint at the relationship between the respective units of the three last groups, two of its details make possible a partial reconstruction of the system of troy weights. According to these details the mithqāl used in the Cairo mint consisted of 24 qīrāṭs (4v), and 20 dirhams equalled 100 qīrāṭs (7r). The following scale of troy weights can be reconstructed:

	mithqāl	dirham	qīrāṭ	ḥabba
ḥabba				1
qīrāṭ			1	?
dirham		1	5	?
mithqāl	1	$4\frac{4}{5}$	24	?

Chapter IX

FUEL, CHEMICALS AND OTHER INGREDIENTS

The following articles were required for various processes of converting raw material into coins.

Fuel

Both wood (6r , 6v , 7r) and charcoal (3r , 6v , 7r , 7v , 9v) were used as fuel. Wood was not only needed for lighting (7r), but also to obtain a strong fire (3r). Thus the strong fire for refining gol was made of the wood oft the sant tree (acacia) (3r) or of the charcoal of the same wood (3r). The glow was sustained by blowing the bellows.

Chemicals

A special compound (turāb al-taʿlīq) was placed in the cups in which the refining and testing of gold was carried out. This compound consisted of 1 kayl of salt (milḥ), 2 kayls of fine powder, obtained by crushing and sifting a new soft red brick, and a little water (5r). The refining of silver (6v), extracting it from ḥabaq (7r) and testing the alloy of the wa-

raq dirhams required lead,while the extracting of silver and gold from the earthy residue was done by amalgamating it with mercury (6r; 8v).Hubūb al-nār (grains of pomegranate ? sulphur ?) were used in the process of fusing the alloy of which the waraq dirhams were produced.Salt was required in the process of polishing gold (6r) and silver blanks (8r). For that purpose both nuqra and waraq blanks had to be dipped in mā al-līmūn (7r) and khall ḥādhiq (sharp vinegar or vitriol) (8r) .

Other ingredients

Crushed coal was used during the process of pouring the molten waraq alloy on the khudha (7v).Cups and furnaces were sealed with clay (3v ; 5r ; 5v ; 7v ; 9r).The polishing of blanks was done with soft sifted sand (raml nāʿim mugharbal) (6v ; 8r ; 9v), the wood of the sumaq tree and bran (7v ;, 8r).Finally potsherds (4r ; 6r ; 8v) and riqq (parchment) (6v ; 8r ;) were used for distillation.

Chapter X

RAW MATERIAL USED FOR COINING

The raw material required for the issue of various types of al-Kāmil's coins consisted of gold, silver and copper. While the treatise of Ibn Baʿra says nothing about the nature of the supplies of copper, it contains many details referring to the gold and silver which were delivered to the mint of Caire. This kind of precious metals arrived at the mint in the shape of ore, and in a refined form, such as obsolete coins, jewelry, etc.

Speaking about the origins of the ore Ibn Baʿra describes the conditions which had existed under the Fāṭimid caliph al-Āmir, that is to say about 100 years before the reign of al-Kāmil. The ore reaching the mint of al-Āmir consisted of gold dug in mines (al-dhahab al-maʿdanī) (2v), of ' sand-gold ' (turba) (2v), and of 'vegetal' gold (nabāt)(2v). The first kind of ore is said to have been imported from Maghrib.[1]

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1) This could be that high quality gold-ore which merchants of Sijilmāsa used to obtain in Gana (Kanna of today) and Takrūr (also in the French West Africa of today). Cf. Abū al-Fidā, Géographie, ed., Reinaud, ii. p. 220

Although Ibn Baʿra does not refer to the origin of the 'sand-gold' he probably means the veins of gold in the Wadi ʿAllaqī,which was well known to ancient[1] and Medieval geographers[2].The rather naïf term of ' vegetal gold ', used by Ibn Baʿra,refers probably to 'wash-gold',which was carried by the Nile from the regions situated beyond the Mountains of the Moon (the Mt Ruwenzori of today)[3],down to Aswān,and below.(2v)

The ample supplies of gold-ore are considered by Ibn Baʿra to have been the reason for the excellent standard of dinars of al-Āmir.(2v).One can feel from Ibn Baʿra 's words, when he speaks about the scarcity of gold,(2v),that things looked different in his own days.Difficulties in the supplies of gold in Ayyūbid Egypt resulted from changed political and economic conditions.Several customs-frontiers separating Egypt from North Africa,and the loss of maritime supremacy to the Italian navy,must have caused serious cuts in trade exchange between Egypt and the Maghrib,which had flourished at the time of the political union of these two areas under the early Fātimids.General uncertainty,caused by the impact of the Crusades,made people hide the gold in their possession in expecta-

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1) cf.Diodore de Sicile,in Sabatier,Production de l'Or,p.22

2)cf.Mez,Die Renaissance des Islam,p.415.also Ch'ang Te in Bretschneider,Medieval Researches,1,pp.141-2

3) Minorsky,Hudūd ,p.69

tion of securer times,instead of delivering it to the mints for conversion into coins.This was probably that vice of hoarding which Ibn Baʿra is complaining about (3r).The intensification in trade relations with Europe,successful external policy,and internal stability,secured by the stern measures of al-Kāmil,all these factors must have caused an increase in imports of the gold-ore,which resulted in the high standard of al-Kāmil's dinars.[1] The information of Qalqashandī [2] according to which the gold coined in the Egyptian mints was imported from the land of the Takrūr,suggests that the regions of West Africa still remained a source of the gold-ore,like at the time of al-Āmir.

On its arrival to the mint,the precious ore was submitted to various chemical processes,by means of which both gold and silver were obtained for coining purposes.

Obsolete coins,jewelry and other precious objects made of refined metals,constituted another type of raw material used by the mint.This kind of material required only some adjustment to raise or reduce its standard of fineness to the official level.Gold coins did not offer any difficulties,for the composition of their particular alloys was well known to experienced mint-officials,so that the adjustment of that sort of ma-

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1) see the diagram at the end of the following chapter.

2) Qalqashandī in Anastase-Marie,Nuqūd al-ʿArabiyeh,p.115

terial could be easily calculated.Of the coins restruck by his mint Ibn Baʿra mentions those issued in Tyre,Damascus,Irbil, Sicily,as well as those struck by the Atabegs of Syria,the Murābiṭs and Muwaḥḥids. (4v)

More difficult procedure was required for refining coarse metal in the shape of jewels,for example.This material had first to be assayed with a touchstone,or tested in the refining fire,by far more reliable method.It was only after its standard had been ascertained that the minters could proceed with adjusting its alloy.

As for silver it had also to be refined,that is to say, cleared from all admixtures contained in its body.

The mint of al-Kāmil apparently relied for the supply of precious metals on private persons who delivered the bullion or coins in the mint and obtained official Egyptian currency in exchange.The mint did not accept,however,gold of Byzantine origin,unless it had previously been subjected to a special tax called al-khums.[1] (8v)Those who delivered gold to the mint were bound to pay certain fees,which were meant to cover expenses of the mint and the tax imposed by the dīwān.The fees imposed on gold amounted to 5%.Those imposed on silver are not referred to by Ibn Baʿra.It is known,however,that in A.H.587 (A.D.1191) the mint of Cairo charged $14\frac{1}{2}$ % for the coining of silver.[2]

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1) for the nature of this tax see Ibn Mammātī,Kitāb Qawānīn,p. 326

2) ibid.,p.333

Chapter XI

MONETARY ISSUES

OF THE MINT OF AL-KĀMIL

Ibn Baʿra speaks of three types of coins which were struck in the mint of Cairo in his time. These were dinars, nuqra dirhams and waraq dirhams.

Speaking of the Egyptian dinars of al-Kāmil Ibn Baʿra emphasizes their high standard of fineness. He states that the Egyptian dinars reached a very high standard in A.H.514 (A.D.1120) when the caliph al-Āmir ordered an investigation into proceedings of his mint. This standard, called al-Āmirī, remained unattainable by others, until the accession of al-Kāmil. It was under this Ayyūbid sultan that the standard of the Egyptian dinars was said to have surpassed the Āmirī standard, excelling the standard of all foreign gold coins.[1)]

An examination of the specific gravities of the Egyptian and other dinars of the period of the Crusades confirms the statement of Ibn Baʿra. The percentage of pure gold contained

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1) IB, fo 2v

in the alloy of Āmirī dinars which in A.H. 511 (A.D.1117) amounted to 97.707 % ,reached 98.198 % in A.H. 514,the year of the alledged investigation.Although the standard of Āmirī dinars struck in the subsequent years was considerably debased, (those struck in A.H. 516 and 517 show their standard reduced to only 85.425 % and 83.598 % respectively) - the standard of A.H. 514 remained unequalled for a whole century.

The standard of Egyptian dinars suffered especially under the administration of Saladin.The armament drive and long war efforts of that Egyptian sultan,caused a considerable drain on Egypt's gold ressources.Despite the difficult economic situation caused chiefly by the disruption of trade activities between Damascus and Egypt by the raids of the Crusaders and their outposts on the Red Sea,Saladin had to procure gold cash to pay for arms supplied by Christian merchants.To cope with this dangerous economic situation Saladin had to debase the standard of his coinage by reducing the percentage of pure gold in his dinars.This measure is revealed by the specific gravity of the dinars of A.H.583 (A.D.1187 -probably before the expedition against the Crusaders,crowned by the victory at Ḥaṭṭīn).The percentage of gold is reduced to 80.88 % only.This situation improves gradually under his successors al-ʿAzīz and al-ʿĀdil when the standard reaches 94.42 % (A.H.589) and 98.654 % (A.H.615) It was under al-Kāmil,however,that the Egyptian

dinars not only reached but even surpassed the renown standard of al-Āmir,[1] amounting in A.H. 627 to 99.311 ‰ pure gold.

A dinar of al-Kamil[2]

The standard of al-Kāmil's dinars proves that under his rule Egyptian gold currency was well stabilised. Slight fluctuations in the standard of his dinars should be attributed to imperfection in manufacture rather than to changes in economic circumstances. It is characteristic, however, that his dinars possessed that high percentage of pure gold right from the beginning of his reign. The fact that the Egyptian gold currency was not affected by the political and economic threat caused by the invasion of the Franks,[3] proves that the standard of al-Kāmil's dinars rested on solid gold reserves produced by the sound administration of his immediate predecessors or that of al-Kāmil himself, during the period of his viee-royalty.

It was under al-Kāmil that the legend on the Egyptian dinars underwent a process of evolution. The inscriptions on his early dinars (and dirhams as well) were carried out in

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1) see diagram at the end of this chapter

2) Lane-Poole, Cat. of Oriental Coins in the B.M., iv. pl. iv.

3) cf. chapt. III, p. 82

usual Kufic characters[1]. This was abandoned in A.H.622 (A.D.1225), when Naskhī script was substituted for the former one.

al-Kāmil's dinar with Naskhī inscription

Ever since the abolishment of the Fatimid caliphate the name of the Ḥabbāsid caliph reappeared on Egyptian coins. This open proclamation of the adherence of the Ayyūbids to the Sunna was a useful measure of propaganda aimed against lingering pro-fāṭimid feelings. The appearance of Ḥabbāsid names on the coinage of al-Kāmil carried with it no political obligations whatever. Neither did the Ḥabbāsid caliph exercise any political authority over Ayyūbid Egypt nor did al-Kāmil manifest his nominally lower status in a more practical way like paying tribute, for example. Providing the coinage with the name of the Amīr al-mūminīn, cannot, for instance, be compared with the appearance of al-Kāmil's name on the coinage of minor Syrian amirs, who in this way recognised the effective suzerainty of the Egyptian ruler.[2]

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1) cf. the dinar of al-Kāmil on the preceding page.

2) cf. the coinage of al-Muẓaffar of Irbil, Lane-Poole, Cat. of Oriental Coins in the B.M., Add., p. 311

The nuqra and waraq dirhams mentioned by Ibn Baᶜra represent a more complicated problem. Before discussing them, I feel it necessary to give here some details referring to Ayyūbid dirhams and their alloys, which are contained in Maqrīzī, and ibn Mammātī. They are arranged here in a chronological order.

Maqrīzī [1]: In Shawwāl A.H.583 Saladin abolished Black dirhams and struck Nāṣirī dirhams, the alloy of which consisted of 50 % silver and 50 % copper.

Ibn Mammātī [2]: In A.H. 587 the alloy of Egyptian dirhams consisted of 30 % silver and 70 % copper.

Maqrīzī [3]: In Dhū al-Qaᶜda A.H.622 al-Kāmil issued al-Kāmilī or mustadīra dirhams, the alloy of which consisted of 70 % silver and 30 % copper. He abolished the waraq dirhams which had hitherto been in use in Cairo and Alexandria. This state of things remained unchanged during the rest of the Ayyūbid rule.

Against this rather contradictory evidence the expert opinion of ibn Baᶜra leaves no doubt about the nature and alloy of the Ayyūbid dirhams. On the face of his information it beco-

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1) Mq., Shudh., Mayer, p.12

2) Ibn Mammātī, Kitāb Qawānīn., p.333

3) Mq., Shudh., Mayer, p.12

mes clear that there were two kinds of dirhams, nuqra and waraq. The alloy of the former consisted of silver only, and that of the latter of 30 % silver and 70 % copper.[1] This statement not only contradicts Maqrīzī's information, already undermined by ibn Mammātī, but it throws an interesting light on the nature and function of the two different types of dirhams.

The official currency in Islamic countries was based on gold and silver. The rate of exchange between various types of coinage was based on the 'bonitas intrinseca' that is to say on the real percentage of precious metal in their alloy. For that reason also all calculations were done by weight units, mithqals in the case of gold, and dirhams in the case of silver coins. While pure gold and silver coins were undoubtedly used in important trade operations, the internal Egyptian market possessed also its own currency, to meet the needs of the local retail trade. The alloy of this type of currency contained only a certain proportion of silver. The exchange value of this coinage was again based on its intrinsic value. According to Maqrīzī this type of coins, called Black dirhams, was abrogated by Saladin, who issued a new type called Nāṣirī, and which consisted of 50 % silver and 50 % copper. That Saladin might have really raised the standard of his dirhams is not impossible, considering that this reform followed on his splendid victory at Ḥaṭṭīn,

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1) IB, fos 6v and 7v

which removed the danger of the Crusaders from the Damashqi - Cairo caravane route.At any rate his financial reform must have been of short standing since in A.H.587 the alloy of his dirhams amounted to no more than 30 % silver and 70 % copper.Exactly the same proportions are given by ibn Baᶜra with regard to the waraq dirhams. In the light of this statement and of that contained in the Chronicle of the Patriarchs of Alexandria,the account of Maqrīzī lacks in precision.I do not alude here to the fact that contrary to his information, the waraq dirhams were in circulation long after the reform of A.H. 622,because the prohibition to use a certain type of coins could have been of temporary character only, required at the time of the speculative reforms of the sultan.What I refuse to accept from Maqrīzī is his claim that the alloy of the post-reform dirhams was raised to 70 % silver and 30 % copper.The mistake,which might have easily arisen from a slip in writing down,or rather copying the source of his information, has now been detected thanks to the treatise of Ibn Baᶜra. My conclusions are based on the following observations.

1) Ibn Baᶜra states that 1 mithqal of Egyptian dinars was exchanged against 40 waraq dirhams.This was the state of things prior to the reform of A.H.622 [2]

2) According to Abu Shāma the ratio of Egyptian dinars

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1) IB,fo 4v

to dirhams was in A.H. 636 as 1 : 12. [1]

3) This is confirmed by the Chronicle of the Patriarchs of Alexandria, which gives the exchange rate as 12 $\frac{1}{4}$ or 12 $\frac{1}{8}$ of nuqra dirhams or 35 $\frac{1}{4}$ waraq dirhams per dinar (i.e. one mithqal of dinars). [2]

When Ibn Baʿra speaks of 40 dirhams, he adds that he means by them 40 waraq dirhams. These were the common dirhams in every day use in Egypt, and whose alloy consisted of 30 % pure silver only. Now, the 40 waraq dirhams of 30 % silver each correspond exactly with 12 dirhams of 100 % silver, that is to say 12 nuqra dirhams, which was about the usual exchange ratio of silver to gold. Thus the nuqra dirhams appear to be the standard dirhams of pure silver [3] used in international trade exchange, and on the base of which the course of local currency was calculated.

What was the real nature of al-Kāmil's reform ? The years A.H.622-3 witnessed a rapid increase of the ratio of Egyptian dirhams to dinars. Was it due to the improvement of the standard of dinars (cf. the diagram at the end of this chapter) or to the reduction of the percentage of silver in the alloy of the waraq dirhams ?

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1) cf. Cahen, La Syrie du Nord, p.470, ftn.16

2) Blochet, Histoire d'Egypte de Makrizi, p.427, fnt.1

3) and not of $\frac{1}{3}$, as suggests prof. Mayer in QDAP , iii (1934), p.22

The rate of 44.5 per dinar which is reported in A.H. 622 [1] would suggest a reduction of pure silver to 26.9 % only.

In the year A.H. 623 the ratio rises to between 47-60 dirhams, which is tantamount to 25.5 - 20 %. [2]

With the introduction of the new dirhams the exchange rate amounts to 37 new and 42 old dirhams per dinar, otherwise 32.4 % and 28.5 % respectively. [3]

Finally the exchange rate is fixed at 35 new and 45 old dirhams per dinar which amounts to 34.2 % and 26 % pure silver. [4]

Thus although the alloy of the new dirhams seems to be sl slightly improved, its percentage of silver wavers at 30 %, and not 70 % silver, as suggested by Maqrīzī. It is possible, however, that the new exchange rate never resulted from an improvement of the alloy, but represented the so-called valor impositus, i.e. the value imposed arbitrarily by the sultan.

While I do not wish to enter into a discussion concerning the nature of the Black dirhams, I feel it necessary to challenge again the view of prof. Balog, this time concerning the we-

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1) Blochet, Histoire [illegible] d'Egypte de Makrizi, p.362, fnt.

2) as above

3) as above

4) as above

raq dirhams.Prof.Balog considers[1] the quadrangular dirhams of the Ayyūbids,which were manufactured by means of transversal cutting of narrow ribbons,to be waraq dirhams ,and the small round dirhams of al-Kāmil to be the new mustadīra type of the post-reform type of dirhams.

Here again the treatise of ibn Baᶜra suggests a different view of the matter.Firstly this method of producing dirhams by cutting cast ribbons corresponds exactly with the description of the method in which nuqra and not waraq dirhams were produced[2].On the other hand round dirhams of various sizes,discussed by prof.Balog,recall rather the round irregular waraq dirhams,whose manufacture is so thoroughly described by Ibn Baᶜra.[3]

I have already mentioned that the alloy of the pre and post reform Egyptian local dirhams was basically the same (about 30 % silver).Although I have failed in my attempt to obtain from 'Bibliothèque Nationale ' the exact proportions of silver contained in the post-reform dirhams discussed by prof.Balog,I think that the remark of Lavoix,classifying the

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1)Balog,Les Monnaies Divisionnaire de la Fin de l'Epoque Fatimite et du Début de l'Epoque Aoubite en Egypte,BIE,xxxiii, p.31 ff.

2)IB,fo 6v

3)IB,fo 7v

the metal of which they were produced as 'argent du bas titre',[1] is a confirmation of the above statement.Thus the dirhams called by prof.Balog 'the new reformed type of al-Kāmil',represent in my opinion,a reformed type of the old waraq dirhams.The term 'mustadīra' given to this post reformed coinage,did not refer to the shape of these dirhams,but to the round legends rather,which appeare on the post-reform dirhams,and which are so exhaustively described by prof.Balog himself.[2]

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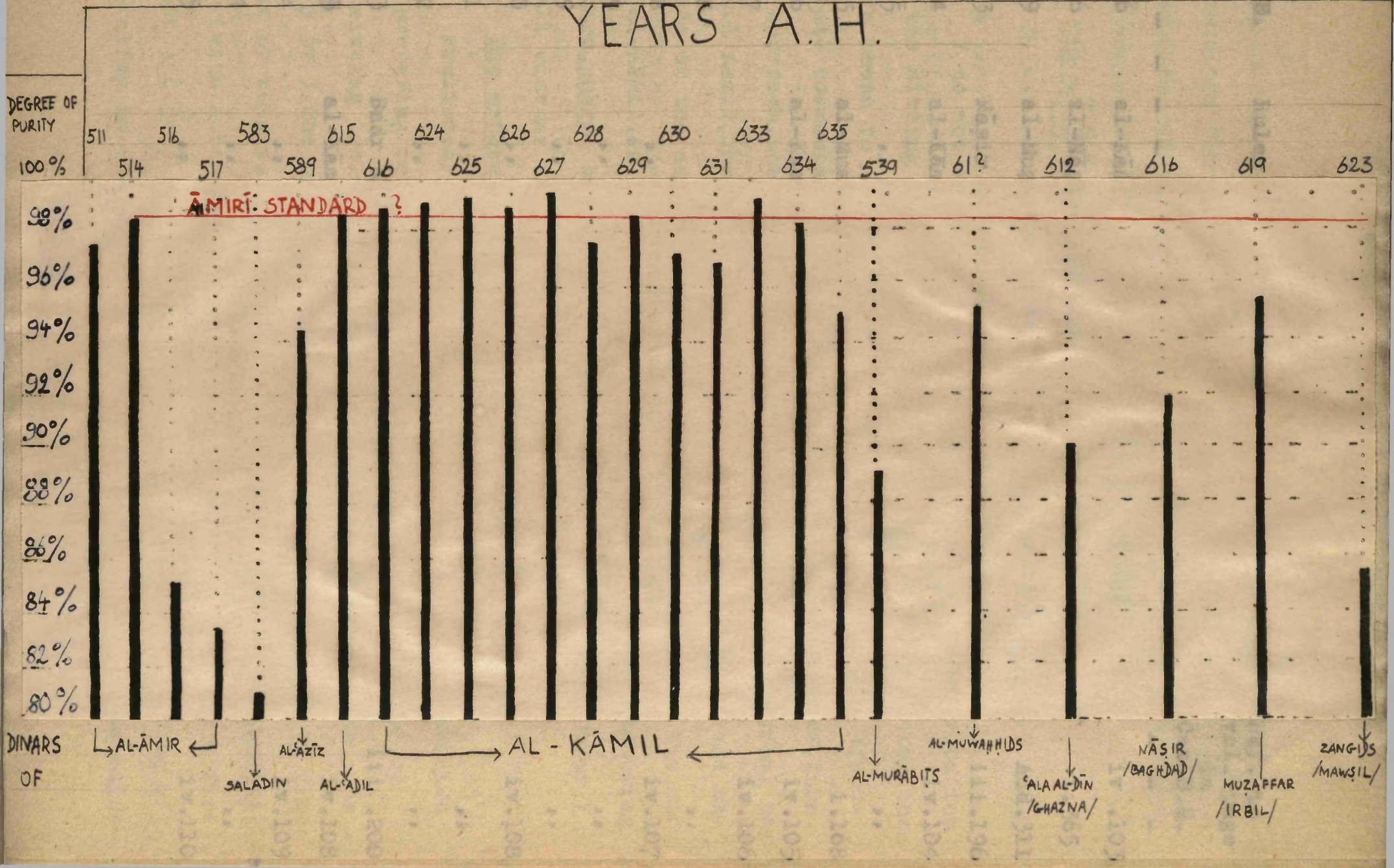
1) Lavoix,Cat. des Monnaies Musulmanes,iii.p.245

2) Here is the list of coins which I examined for the composition of the diagram that follows.

A.H.	Ruler	Specific Grav.	Reference to vol-page in Cat.B.M.
511	al-Āmir	18.878	iv . 52
514	,,	18.973	,,
516	,,	16.505	iv. 53
517	,,	16.152	,,
539	Tafshifin (al-Murābiṭ)	17.204	v . 24
583	Saladin	15.627	iv . 219
589	al-ʿAzīz	18.253	iv . 76
61?	Yūsūf b.Yaʿqūb (al-Muwaḥḥid)	18.384	v . 37
612	Muḥammad (Khwarazm)	17.361	Add. 372
615	al-ʿĀdil	19.062	iv . 96

DIAGRAM showing the quality of dinars



A.H.	Ruler	Specific Grav.	Ref. to vol.-page in Cat.B.M.
616	al-Kāmil	19.106	iv .103
616	al-Nāṣir (ʿAbbāsid)	17.747	i.365
619	al-Muẓaffar (Irbil)	18.43	Add.311
623	Nāṣir al-Dīn Maḥmud (Mawṣil)	17.514	iii.196
624	al-Kāmil (Miṣr)	19.119	iv.104
625	,, (Cairo)	19.154	,,
625	al-Mustanṣir (ʿAbbāsid)	18.095	i.168
626	al-Kāmil (Cairo)	18.902	iv.105
627	,,	19.178	iv.106
628	,,	18.888	,,
628	,, (Alexandria)	18.241	iv.107
629	,, ,,	19.047	,,
629	,, (Cairo)	18.547	,,
630	,, (Alexandria)	18.825	iv.108
631	,, (Cairo)	18.764	,,
632	,, ,,	18.737	,,
633	Badr al-Dīn (Mawṣil)	17.689	iii .200
634	al-Kāmil (Cairo)	19.174	iv.108
634	,, ,,	19.	iv.109
634	,, (Alexandria)	18.522	,,
635	,, (Cairo)	18.411	iv.110

Chapter XII

TECHNICAL PROCESSES

I do not intend to embark upon a detailed interpretation of the minting processes described by ibn Baᶜra.Repeating them here seems to me pointless,unless providing them with appropriate comments from a purely scientific point of view.Such an approach,however,lies outside the scope of a historical thesis.I shall,therefore,limit myself to the main phases and methods of the actual minting production as employed by the mint of al-Kāmil.As the various methods used for manufacturing dinars,nuqra and waraq dirhamds,differed from each other,I shall discuss them separately.

The method of producing dinars.

Preliminary steps in the production of dinars consisted in preparing refined gold.The refined gold was obtained by submitting gold ore to the process of cupellation (3r ; 3v ; 5r ; 5v).The next step was to ascertain the standard of fineness of this refined metal.This was done by means of qualitative (with a touchstone) (5r) and quantitative (with a fire-test) (5v) checks. This was followed by the adjusting of the alloy to the required official standard (6r).The adjus-

ted gold was molten down in a special solution and poured into a mould.The flans of dinars were produced by the method of casting (6r).The polishing and stamping of the flans completed the process of producing dinars (6r).

The method of producing nuqra dirhams.

Silver destined for the conversion into dirhams had first to be tested by means of filing and exposing the filed places to the fire.If the silver betrayed some impurities,it had to be refined by fusing it with lead.The purity of the refined silver was tested by means of annealing (6v).The silver thus prepared was molten down and cast into oblong,flat ribbons (6v ; 7r). The flans of nuqra dirhams were obtained by the appropriate cutting and subsequent trimming of the ribbons (7r). The cutting was followed by rechecking the weight of the flans. They were then whitened,polished,heated and stamped. (7r).

The method of producing waraq dirhams.

The first step in the process in question consisted in fusing the required proportions of silver and copper. (7v).The molten alloy was poured on a special instrument by means of which irregular pellets were obtained (7v).These pellets were then washed (7v) and their alloys checked by means of a quantitative test (8r). The pellets were turned into flans by means of hammering.These flans were then whitened,polished and finally stamped (8r).

In all these processes great care was taken to prevent any

wastage of precious metals.Gold and silver which were absorbed by the earthy compound,were extracted by means of the amalgamation with mercury (5r ; 5v ; 8r ; 8v).

PART THREE

Chapter XIII The Manuscript of ibn Ba'ra

Chapter XIV English Paraphrase of the Arabic Text

Chapter XV Arabic Copy of the Manuscript

PART THREE

Chapter XIII

THE MANUSCRIPT OF IBN BAʿRA

The manuscript entitled Kitāb fi kashf al-asrār al-ʿilmiya bi dār al-ḍarb al-miṣrīya, written by Manṣūr ibn Baʿra al-Dhahabī al-Kāmilī, is at present in the possession of the Library of the King of Egypt [1]. Its existence is also reported by Brockelman who, registering it in the paragraph called 'die Politik', states that "Manṣūr b.Baʿra.....schrieb 1135-1722 [2]

A critical examination of the contents of this treatise makes the remark of Brockelman untenable. The very words 'mawlanā al-sulṭān al-malik al-Kāmil', which appear on folio 2v of the manuscript, constitute sufficient evidence that ibn Baʿra wrote his book during the reign of sultan al-Kāmil, that is between A.D. 1218-1238. The text constains also other evidence which, in my opinion, permits to establish more precisely the date of the composition of the treatise. The point which has impressed me in reading the text of ibn Baʿra is the careful and conscientious approach of the author to the subject. Thus, for instance, the biographical details about the Fāṭimid caliph al-Āmir are absolutely correct. The same applies to the information concerning the

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1) cf. Cairo, v. 390

2) Brockelman, Geschichte der Arabischen Litteratur, G, ii, 356

minting activities of al-Āmir and al-Kāmil, as well as the standard of their dinars[1]; the exactness of this information has been confirmed by the results of the analysis of the available coins[2]. It seems, therefore, unlikely that such a conscientious author would have failed to mention the famous reform of al-Kāmil, which took place in Dhī al-Qa'da A.H.622.[3] The reason why no trace of this reform can be found in the treatise of ibn Ba'ra, lies in the fact that it was probably composed before the reform in question. This evidence, negative though it is, can be supported by the fact that ibn Ba'ra gives the exchange rate of waraq dirhams as 40 against 1 dinar.[4] It is known from elsewhere that, beginning with the year A.H.622 down to the end of al-Kāmil 's reign, the course of waraq dirhams was lower, or higher in the case of the mustadīra dirhams, but never exactly 40.[5]

Basing my conclusions on the above arguments I propose to consider A.H.615 (A.D.1218) as 'terminus post quem ' (the year of al- Kāmil 's accession to the throne) , and Dhū

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1) IB, fo 2v

2) cf. chapt.xi, pp.117 ff

3) Mq., Shudh., Mayer, p.12

4) IB, fo 4v

5) cf. Chapt.xi, p.124 f.

al-Qa da A.H. 622 (15 Nov 1225) as 'terminus ante quem ', between which ibn Baᶜra composed his treatise. Thus the informations contained in the work of ibn Baᶜra refer to the minting activities of the mint of Cairo during the first half of al-Kāmil's reign (except, of course, where stated otherwise by the author himself).

Although the year A.H. 1135 -A.D.1722, mentioned by Brockelman , is unacceptable as the date of the composition of ibn Baᶜra's treatise, it is, nevertheless correct as far as the origin of the existing copy is concerned. The lapse of nearly 5 centuries, separating the preserved text from the autograph of ibn Baᶜra, accounts for many difficulties which face anyone attempting a proper understanding of its contents.

Nothing is known about Manṣūr ibn Baᶜra, except that he was a member of the staff of al-Kāmil's mint, which fact can be inferred from the contents of his treatise. While his expert knowledge of minting operations, and of chemical processes especially cannot be questioned[1], this is not true of his knowledge of Arabic. In addition to many grammatical mistakes, probably committed by ibn Baᶜra himself, the preserved manuscript is full of corrupted terms which should be ascribed to the fact that the person copying the earlier manuscript, lacked scientific education which would have permitted him to perform this task in full comprehension of the text at his disposal. Thus the existing copy

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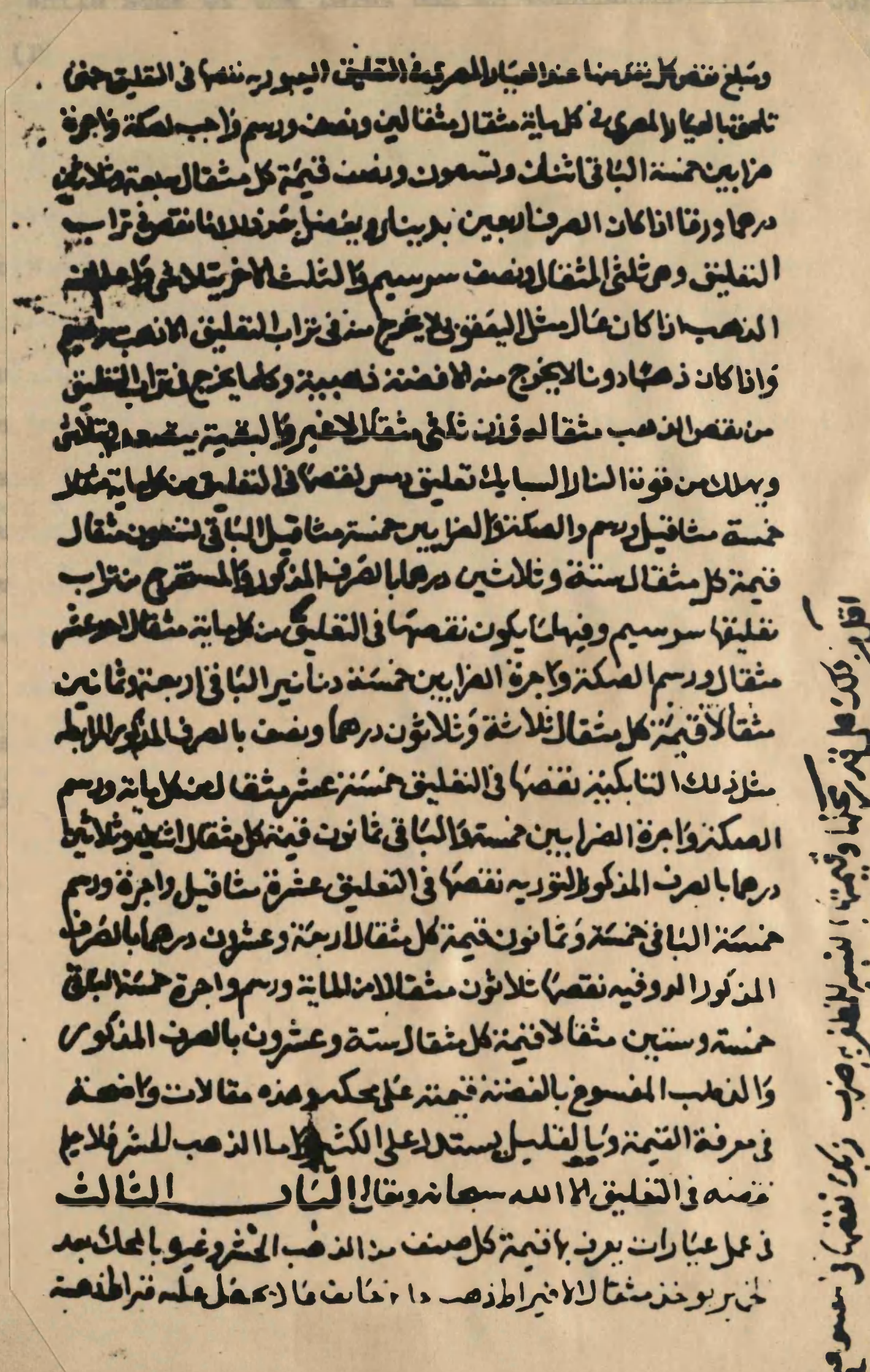
1) cf. Holmyard, The Makers of Chemistry, p.77

of ibn Baᶜra's treatise represents an extremely difficult text. Folio 4v will serve to illustrate the point.



While some of the terms can be reconstructed with certainty (Dimishqi, Irbil, Nūriya, Dūqiya), for others I have suggested only a tentative reading.

To attempt an edition of such a corrupted Arabic text on the basis of a single manuscript would certainly be a risky undertaking. Neither was it thought advisable to attempt a literal translation, and only a paraphrase is used below. I do not think, however, that any major points of technical procedure have been missed, except perhaps for the last four lines of folio 5v and two first lines of folio 6r , which I have not been able to understand satisfactorily. I omitted also the whole introduction and the list of chapters, as well as the fragment of folio 3v - 4r , which deals with the medicinal properties of gold, and has no bearing upon the subject of minting operations. The numerous footnotes, which my Arabic copy of the existing manuscript is provided with, are there to illustrate the many shortcomings and difficulties complicating the task of interpretation.

Chapter XIV

ENGLISH PARAPHRASE OF THE ARABIC TEXT

fo 2r (p. 172)[1] Chapter One : on the extracting of gold from silver which God has created in the body of gold ore, and on making it entirely and absolutely pure, how give this gold a reliable standard such as that of the Āmirī gold and so as to conform with it precisely without excess or loss. This will be done in a method which will constitute evidence.

The Ancient kings of Egypt[2] used to make gold in the mint - fo 2v - without a basic standard. Sometimes their standard would rise and sometimes fall without their knowledge. This continued until the reign of al-Āmir after whose name the Āmirī dinars were called. He was one of the Egyptian kings[3]

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1) the figures in brackets refer to the pagination of my Arabic copy of the manuscript.

2) see below

3) It is interesting to notice the distinction made by ibn Baʿra with reference to the Fāṭimids and their predecessors.

and was born in al-Qāhira al-Muʿizziya on the Tuesday night 13 Muḥarram of the year 490.He began his rule at the age of 5 years , 1 month and 4 days .[1] In the year 514 he proceeded with a vigorous inquiry investigating the secrets of gold production in the mint.He died on the 3rd of the Dhū al-Qaʿda of the year 524 [2].By his careful examination (p.173) of this problem he learnt secrets of gold and fixed the standard of gold so that it could not be surpassed by others.But when our lord sultan al-Kāmil learnt about the high quality of the Āmirī dinars he eagerly desired that his dinars should surpass them. And in fact they are of higher value than the Āmirī dinars. Thus neither in the East nor in the West exist dinars excelling the standard al-Āmirī al-Kāmilī.[3]

The reason for the success of al-Āmir's achievement was that he found that there are 3 types of gold; mineral, sand and vegetal.As for the mineral gold (p.174),God has created it in rocks in the shape of ramified branches.It is found in the Maghrib.Sand gold consists of nuggets mixed with gypsum and sand and vegetal gold is that which grows in the Nile beyond the Mountains of the Moon.The fine parts of this plant are carried down the Nile to the territory of Aswān where they are deposited

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1)cf.IE,i.p.328

2) as above

3)cf.chapt.xi.p.116 and 117.Also diagram on p.128

in the earth and are seen in Aswān pottery in the shape of small pearls.The finest particles of this fine vegetal gold are carried from Aswān down the lower reaches of the Nile , appearing to those who look for them in the sand on the banks of the river , But the efforts spent on extracting them do not pay as this gold is very weak.As for the gold which the Nile cannot carry away it remains stuck in its place and looks like oblong layers of gypsum.These,then,were the three kinds.

It is the silver tinged with gold,which appears first in the ore, but gradually gold prevails in it over the silver,as the metal develops. (p.175). Gold reaching the mint consists of the pure gold,whose process of ripening was completed by nature, and of the inferior underdeveloped one.

Gold is the most numerous of all minerals in God's world. It does not perish and exists everywhere.Furthermore it is growing daily owing to its incessant natural increase.The reason for its scarcity in the hands of the people - fo 3r - is to be found in their excessive love for it and desire for it , and the fact that they store it away. Upon their death,their hiding places remain concealed and the metal disappears from circulation.

Let us return to the point where we left our narrative. Al-Āmir took three equal parts,one of each of the three kinds of gold,cast them into ingots,flattened them,cut them as thin

as nails and melted them in the mint-furnace for one night in the usual way,(p.176) turning the three different kinds of gold into a single one. A strong fire of Acacia wood, made over them , dissolved the gold and silver which God has created but nature has failed to turn into pure gold. As for pure gold, it does not melt,resisting the fire on account of the perfection of its nature. But its weight is reduced by the amount of silver eliminated from it in the refining fire [1],because of the weakness of its body and the imperfection of its nature.The extracted silver is weighed with precision.How this silver is extracted from the earthy compound shall be described later.[2] This silver is labelled as follows; 'Silver coming from the first night of the refining process'. The gold is then refined for another night,and so the third and the fourth nights (p.177),until sirsīm [3] appears instead of silver in the earthy compound.You then go back to the'silver coming from the first night of the refining process ',add to it

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1) taʿlīq .Cf Dimashqi,Al-Ishāra ilā Maḥāsin al-tijāra,p.8 ; also Ritter,Der Islam,Band vii,p.51;also Wiedemann,Beiträge, xxxii,p.37 ;also ibn Mammātī,Kitāb Qawānīn,p.332 ;also Wstenfeld,Die Geographie und Verwaltung von Ägypten,p.165 ftn

2) see below p.144

3) is it sirr al-sīm ? (the core of gold).For the meaning of sīm as gold,see al-Mukhaṣṣaṣ,xii,p.22

an equal amount of 'non golden silver'[1], and cast it together with the gold. You should flatten it, cut and refine it for one night and take it out in the morning. You then squeeze it and take down its weight. If the loss suffered by the gold is smaller than the quantity of silver added to it than the gold is not pure. You do the same with the 'silver coming from the second night of the refining process ', and again take out the gold, wash, squeeze and weigh it. You do it (p.178) in the same way with the remaining portions of silver adding to it an equivalent of the gharība silver[2]. If the losses suffered by gold equal the weight of the silver which was added to the gold, then the gold is absolutely free from silver. -fo 3v -

The reason for this is that whenever the ore is returned to the refining fire, only pure and clean gold can resist it, while the by-mixtures of silver together with gold of inferior quality must separate from the fine gold.

Describing that process I used the term 'golden silver', meaning by it that silver which oozes out of gold, and which would have become gold if it had remained in the ore. You also should know that the gharība silver, I mean the 'non-golden silver', attracts all the golden silver, separating it from gold and turning into silver. It is inthi this way that gold is purified (p.179) and reaches a fixed standard of fineness which can be

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1) see below this page

2) see below this page

tested with the following experiment.Take four cups of equal size and put in each of them equal amounts of gold,silver,sand and bran mixed with clay.The whole lot should be refined simultaneously under the same fire,all cups being placed on the same level.When the cups are taken out all four portions of gold show absolutely the same standard,because whenever you refine gold,whose standard has already been adjusted,nothing but inferior gold can be lost in the process.The more you refine the gold (p.180) the higher its standard becomes.When the amount of gold has been reduced to $\frac{7}{12}$ its original weight,it never suffers any loss again.

fo 4r (p.182)

Last section of the first chapter describing the method in which the golden silver is extracted from the earthy compound.For this purpose a concave salāya[1] and a fihr[2] (p.183) the size of a hand,both of hard stone,are required.The earthy compounds from each 'refining night' are placed one after the other on the salāya ,mixed with a little water,and pounded with the fihr.You then add a required amount of mercury,mix it with the earthy compound so that the silver amalgamates with that mercury.Pour some water on it,taking care that no mercury escapes when you remove the water.When the earthy compound has been washed away,put the mercury in a piece of parchment and

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1) for the meaning of salāya and fihr see Sigell,Arabisch -Deutsches Wörterbuch,p.98

2) see above

squeeze the mercury by rolling that parchment.Put the silver, which remains in the shape of nuts,on a potsherd and place it over fire.This method will force any remaining mercury to separate from silver.Thereupon the silver is cast and labelled 'silver coming from the first night of the refining process '. This method is applied to each particular quantity of the earthy compound. (p.184).

Chapter Two ;Description of gold coins of different standards and shapes -fo 4v - and a list of losses suffered by each particular type of these coins in the refining process, once they have been adjusted to the Egyptian standard of fineness.

Refining of the Sūrīya gold.[1] Its loss in the refining process amounts to $2\frac{1}{2}$ % before it attains the Egyptian standard.Tax imposed by the dīwān[2] and salaries of minters amount to 5 % .The exchange rate of 1 mithqal of Sūrīya gold is 37 dirhams,with the course of 40 waraq dirhams against 1 Egyptian dinar.Part of the loss can be recovered afterwards. This amounts to $\frac{2}{3}$, $\frac{1}{3}$ being the sirsīm.You should also know

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1) Although the word is almost illegible I propose to read it as Sūrīya ,especially as we know that the standard of the Sūrīya dinars was only slightly inferior to the Egyptian one.Cf.Cahen,La Syrie du Nord,p.470,ftn 16

2) cf. below p. 163 ,fo 8v

that in the case of high quality gold, like al-Yaʿqubī for instance,[1] the earthy compound contains sirsīm only. If you deal with gold of inferior quality (p.185) nothing but golden silver can be recovered from the compound. In any case only $\frac{2}{3}$ of the total loss can be recovered from the earthy compound. The rest disappears because of volatilisation, or destruction by the force of fire.

Refining of the Dimishqi gold . Its loss in the refining process amounts to 5%. Tax and salaries - 5 %. Rest 90 %. The exchange rate is 36 dirhams per mithqal, according to the above mentioned course. Sirsīm is recovered from the earthy compound.

Refining of the Muẓaffarīya, (struck in Irbil)[2], Its loss amounts to 11 %, plus the 5 % levied by the mint. Rest 84 %, with the course of 33 $\frac{1}{2}$ dirhams per mithqal .[3]

Refining of the Murābiṭiya (?) [4] as above. (p.186).

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1) Gold struck by al-Muwaḥḥids ? cf. Sauvaire, Matér. (1882), p.68

2) for Muẓaffar al-Dīn Kukuburī cf. Ibn Khallikan's Biographical Dictionary, ed. de Slane, ii. p.535

3) obvious mathematical error, should be 33 $\frac{3}{5}$ instead.

4) ms. reads Murābita, for gold struck by al-Murābiṭs, cf. Sauvaire, Matér. (1882), p.41

Refining of the Atābakīya (?)[1]. Its loss amounts to 15 %, plus the 5% levied by the mint. Rest 80 %, with the course of 32 dirhams per mithqāl.

Refining of the Nūrīya[2]. Its loss amounts to 10 %, plus 5 % levied by the mint. Rest 85 %. The exchange rate is 24 dirhams per mithqāl.[3]

Refining of the Dūqīya (?)[4]. Its loss amounts to 30 %, plus 5 % levied by the mint. The exchange rate is 26 dirhams per mithqāl.

As to the gold which is debased with silver, its price should be ascertained with a touchstone. As to the coarse gold, only God knows its losses in the refining process.

Chapter Three on the making of touchneedles by means of which every kind (p.187) of coarse gold may be tested with a touchstone.

One mithqāl of pure official gold is taken less 1 qīrāṭ, in the place of which 1 qīrāṭ of golden silver (fo 5r) is added. This is cast into an ingot which is engraved 'the standard of 23 qīrāṭs '. Subsequently 22 qīrāṭs of high quality gold are cast with 2 qīrāṭs of silver. This is engraved 'the standard of 22 qīrāṭs '. By substituting gradually silver for

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1) ms reads al-tābakīya. Most probably refers to coins struck in Mawṣil.

2) Coins struck by the Ayyūbids of Aleppo ?

3) obvious mistake, should be 34 instead.

4) Coins struck in Palermo ? cf. Sauvaire, Matér. (1880), p.449

for gold you get a touchneedle consisting of $\frac{3}{4}$ silver and $\frac{1}{4}$ gold.This standard is 'out-of-course'.The number of standards should be 18,weighing 18 mithqāls,of which 10 $\frac{7}{8}$ is gold (p.188) and 7 $\frac{1}{8}$ mithqāl is golden silver.All these touchneedles are affixed to a silver form together with the touchstone,one after another,beginning with the official one,and ending with the 'out-of-course' standard.

If you happen to meet some unknown gold,you should assay it close to those touchneedles.And the colour of this gold, when compared with that of the touchneedles,reveals to you the real value of the assayed metal.It may happen,however,that this gold contains copper and though it shows fine red colour on the touchstone,its standard of fineness is deficient.But if you heat it its colour will change to black or any other colour, because this metal constains copper,be it in small or great quantity. (p.189).

Chapter Four on the refining of gold and constructing a furnace.

A cupola is built,round inside and quadrangular on the outside.The surface of its base is 4 square hand-spans,except the width of the wall.Each time a course of bricks is laid it is covered with fine clay and salt,so that the interior of the dome is plastered with clay mixed with salt up to the top.The cupola ends with a small open earthenware chimney to let fire come through.It has a door like that of an oven.The bottom of the furnace,which is provided with an earthenware fire-grate,

is raised from the ground to the height of two courses of bricks.

The proportions of the earthy compound which is required for the refining of gold ,fresh,soft,red brick is finely powdered and sifted.Two measures of this substance are mixed with one measure of salt,all this is moistened with a little water. The description of the refining of gold. (p.190).Some of that mixture is put into a cup of red clay,in alternate layers with thinnely cut gold,until the cup is full,whereupon another cup is put on it.Their joints are closed with clay.This clay is sealed to prevent substitution.The cup is then put in the middle of the furnace,on another brick and another upset cup,so that many cups can be dealt with simultaneously.The gold contents of each cup differ (fo 5v - from each other.For that reason cups containing fine gold should be placed above the cups with inferior gold,because fine gold can resist the heat of the fire. The heat is softer below,so that the inferior gold does not suffer great loss.Then Acacia wood is placed between the cups and the walls of the furnace.The wood is lighted and when it burns well,the furnace should be shut with a bolt for a whole night.The furnace is then opened and its contents taken out.The seal is removed and the contents of the cups sifted (p.191) with a sieve over an earthenware vessel.Care should be taken of the earthy residue from which silver is to be extracted.

The loss suffered by gold is ascertained by means of scales.It is also assayed close to the official standard and if their colours are alike,the refined gold is given the official standard.If,however,the standard of the refined gold is inferior, then it must be refined until it reaches that standard.

Chapter Five on the testing of the standard of the haraja.[1] Refined gold is cast into ingots.The two ends of each ingot are sliced off and all of these bits are melted down together.Two mithqāls of this gold are taken and hammered into two leaves,equal in shape and weight.Two other similar leaves are made of the Āmirī gold.They are the check plates.The hammering is done on a steel form[2] .The four plates are put in a cup.(p.192).Firstly the two test plates are placed on a layer of the earthy compound,facing each other,and are covered with another layer of that mixture.Then the two check plates are placed in a similar fashion.The cup is filled with that mixture and labelled 'test cup'.Its lid is strengthened in the usual way and sealed with clay.Then it is deposited in a small furnace,built for that purpose,where it is kept under fire for one night and day.Afterwards both the check and test cups are ta-

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1) haraja seems to be a technicak term given to refined gold delivered to the mint by private customers.cf.fo 8v and 9r. see also Maqrīzī,Sulūk,ed.Ziyada,ii,p.393,ftn .Also Van Gennep,Le ducat vénitien en Egypte,RN,1897,pp.496-7

2)The drawing of this form was contained in the original text, but does not appear in the existing copy.

ken out,and each one of them cleaned with a woolen rag on a wooden board ,until all doubt disappears.The calculations concerning the refining of the haraja,are based upon the results of this experiment.The weight of the plates was previously taken down in mithqāls and grains in order to know the loss caused by the fire,and make the calculations possible.The plates are now weighed on scales and the loss of the test plates is compared with that of the check plates.If the difference does not exceed $\frac{1}{10}$ grain,the haraja is passed[1],and can be turned into dinars after polishing and stamping.[2]

- fo 6r - (p.193) Chapter Six on the polishing of dinars before stamping them.Put molten gold in an earthenware cup and cover it with crushed salt moistened with a little sweet water. Make strong wood-fire over it (p.194) until the salt dissolves like lead.Pour out the gold into a mould in which the flans are cast.Clean the flans with cold water and fine sand.Dry them in a cup over a gentle fire.You may then proceed to stamp.If the cupola of the furnace is stained with salt,you should remove the salt deposit.

Chapter Seven on the adjusting of the standard of haraja by calculating the loss incurred by it in the refining process. Example:the haraja weighs 100 mithq.To reach the official stan-

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1) A similar process is described by ibn Mammātī,Kitāb Qawānīn, p.332

2)The rest of the chapter is not clear.

dard the haraja must lose 1 grain per mithqāl in one night.The test shows that this haraja loses two grains per mithqāl excelling thus the official standard.The following is the method by which the haraja will lose only 1 grain per mithqāl.Only 50 mithq. are submitted to the refining process.The loss amounts to 2 grains per mithqāl.Afterwards these fifty mithqāls are melted together with the remaining lot (50 mithq.) (p.195),so that the losses of the whole haraja (100 mithq.) amount to 1 grain per mithqāl.This method of splitting permits the adjusting of the standard of haraja.You should also know the difficulty arising from the adjusting of gold mixed with copper.Its standard cannot be adjusted and its loss is enormous,unless a quantity of golden silver,amounting to $\frac{1}{10}$ the weight of the gold,is melted with it.The silver extracts the whole copper and permits the gold to reach the exact standard.

. Chapter Eight on the extracting of silver from the earthy compound.Put two kayl-cups of the earthy compound on the stone and add to it 10 arṭāl of mercury.Moisten it with water and turn the stone four times.Remove all water,earthy compound,mercury and silver,from the stone into a vessel.Shake it (p.196) so that the earthy compound mixes with water,while mercury and silver settle on the bottom.Remove the water with the earthy compound into another vessel,where it will dry and take shape of cakes,as described later.Squeeze the mercury,which lies on

the bottom of the first vessel,with a parchment so that the mercury comes out through its pores -fo 6v -,while the silver remains in the shape of nuts.The proportion of silver to mercury in these nuts is still 1 to 6 .Take an earthenware matr,fill two thirds of it with these nuts and the rest with broken potsherds.Place the matr in a kettle with water,fixed in a hole in the ground,and make a fire over the bottom of the matr. The heated mercury is driven off as vapour, to be condensed in the jug with water.In this way silver is cleared from mercury.You then take the cakes,(they are called aṭlāq),break them,put into the matr and repeat the process of distilling the mercury. Place four cups of the earthy compound (p.197)[1] on the stone, adding to it 5 arṭāl of mercury and do it in the same way as with extracting silver.Mercury lost in this operation amounts to 2 $\frac{1}{2}$ dirhams per 1 dirham of silver of gold.

Chapter Nine on the refining of silver with lead.Silver is pure[2] when it is free of copper[3] and black lead.[4] One can test its purity by filing the silver at a certain point and ex-

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1) to extract gold ?

2) ṭalghām.Cf.al-Dimishqī,Nokhbet ed-Dahr,ed.Mehren,p.51

3) and 4) cf.Sigell,Decknamen in der Arabischen Alchemistischen Literature.

posing the filed place to fire.If its colour changes or turns black this silver is adulterated.If the colour does not change the silver is pure.Certainly,even pure silver suffers losses in the refining process,but these losses become gradually smaller every time you repeat the refining.The substance which oozes out of the silver is called habaq.[1] The refining is done in the following way.Put silver in a deep crucible made of a composition (p.198) consisting of equal amounts of slaked lime and sifted ash,moistened with a little water.Add 1 ratl of lead to every 300 dirhams of silver.Place coal on it and blow with bellows,until the silver has melted down.Put some wood on it and continue blowing until the lead and the copper are destroyed and pure silver obtained.Take it out and beat with a hammer on an anvil.Heat it and if the silver does not break in melting -it is pure.But if it does not stand the melting and breaks up,it still contains lead.

Chapter Ten on making the nuqra dirhams.Silver should be melted in a crucible.(p.199).As it gradually liquefies,the dissolved substance is poured out into a darsal,while the crucible with the remaining still undissolved silver should be covered. - 7r - This is more economic than the melting and pouring out of the whole lot,which would result in losses caused by evaporation.The cast ingot is cut into pieces,each of them weighing

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1) see below p.155.ftn 1

more than 1 dirham.Thus,for instance,an ingot weighing 20 dirhams should be divided into 15 pieces,whose total weight should be 100 qīrāṭs.If a piece proves smaller than 1 dirham,then it should be made into a half-a-dirham.This operation is followed by the process of polishing and stamping.

Chapter Eleven on the polishing of nuqra dirhams.Having completed melting and adjusting the flans,you heat them and rub them with lime-water.When the flans turn white you polish them with soft sifted sand.(p.200).Dried up with bran and subsequently cleaned,the flans are ready for stamping.The flans are heated in an iron pot.As for the filings,they are cast together and made into dirhams in the usual way,untill finally there remains but one dirham which,too,is molten,cast,polished and stamped.

Chapter Twelve on the extracting of silver from the lead substance called habaq.[1] Crumble the habaq and put it into a deep crucible made of moistened ash only.Erect subsequently over

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1) for the explanation of this term I applied to Dr D.MacKie (Department of History of Science,University College),who, having consulted Dr.E.J.Holmyard and Prof.J.R.Parlington, suggests that habaq might mean litharge (by-product in separation of silver from lead),although in Arabic this is usually called martak.The description of the process,although detailed,is not clear from chemical point of view.Cf.also Wiedemann,Beiträge,xxiii,Band 42 (1910),p.322.Also al-Shayzari,Kitab Nihayet.,p.79

this crucible a construction of the following shape.A tall chimney 2 ells long,its diameter being 1 ½ span.The bottom of this construction is larger than its top.A rūbāsh[1] is built on top of it.This construction has no door.Light fire with wood,fill the furnace with charcoal,and blow continuously with the rūbāsh until the habaq melts.Add to every qinṭār of habaq 20 arṭāl of lead.When this is absorbed introduce (p.201) all the habaq,one load of habaq and one load of coal.Make sure that it is melted Close to the furnace is another deep crucible made of equal amounts of ash and lime.It is placed lower than the bottom of the first crucible,so that the habaq and the contents of the crucible flow down into that external crucible. On its top appears silver iqlīmīya[2] like zujāj al-būlīs[3],which is dirt coming from

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1) see below p.159

2) iqlīmīya one of the volatile products formed in the manufacture of silver and copper.Mem,As.Soc.Beng.,i (1905),p.56 ftn.Also cf. Ruska,Das Steinbuch des Arist.,p.138.Also al-Razi,ed.Ruska,p.50 ;'wenn das Gold mit einem anderen Mineral vermengt ist...so reinigt seine substanz und treibt sie hoch ein Stein,mit Schwarz gemischt,zum Teil auch von der Farbe des Glases...Auch dem Silber wird bei Qazwini ein ähnlicher Stein zugeschrieben.Nach Vullers soll iqlimiya die Schlacke sein.' -See also ʿAlī ibn ʿIsā,ed.Wood,p.51.Also ibn Baytār,ii.pp.314-5-6.Also Sigell,Arab.-Deusches Wört.p.77 See below fo 4r (p.181).

3) While this word does not figure in any dictionary,various authorities translate it as follows;Kremer,Culturgeschichte.,i. p.278 -(bolus) armenische Siegelerde.De Slane,Prolégomènes,i., p.364 -(bol d'Armenie)-terre sigillés.Sigell,Arab.-Deutsch.Wört. p.78,-(ḥajr būlus)-Paulus-Stein.Lapis Pauli.Van Berchem,Matériaux MIFAO,xxv.p.60 ftn.(al-bals) -potasse.Mantran et Sauvaget,Règlements Fiscaux Ottomans,p.69 ftn.bèlis -cendres alcalines.See also al-zujāj al-būlīs in ibn Mammatī,p.361.Also Dimashqi,ed. Mehren,p.94.

pebble and ash.Throw it away by skimming the surface of the habaq with an iron ladle,whereupon the habaq takes the shape of a cake. In the meantime the furnace is destroyed and in its place you put another deep crucible made of ash and slaked lime, moistened with a little water,in the usual way.Construct over this crucible a small but high cupola.It has a large door and in front of this door is an opening.The mouth of the rūbāsh is introduced into the side of the cupola.Fill this crucible with charcoal and blow on it.Thereupon place the cake on the coal, continuing the blowing until the cake is dissolved.-7v - (p.202).Then the door of the cupola must be closed with the clay and sand,and blowing continues.Yellow smoke escaping through the above mentioned opening,which later turns blue,is a sign that the contents of the cupola are boiling.Subsequently you ope open the door of the cupola and find dried habaq which has turned جنبارى (?)[1] like eyes.In its middle is a cake of molten silver,which must be removed.This silver is placed in a third crucible,open and without any construction,where it is submitted to primary refining[2],until it is rendered pure.This الجلنار is used by druggists for the ointing of the zabādī[3],etc.

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1) I am unable to give any satisfactory explanation for this, undoubtedly,alchemical term.

2)see above p.152

3)small bowl

Chapter Thirteen on the casting of the waraq[1] dirhams. Add to one part of pure silver $2\frac{1}{2}$ parts of red copper, besides the hubūb al-nār[2]. Thus, for example, to 1800 dirhams of pure silver you should add 4200 dirhams of copper, making the total 6000 dirhams and 200 dirhams. The hubūb al-nār are used (p.203) in order to maintain the standard of 30 dirhams. The loss of 200 dirhams which occurs in 6000 is thus replaced with the additional 200 dirhams of the hubūb al-nār.[3] Copper is melted first, and as it dissolves becoming fluid like water, hot silver is thrown into it. After being dissolved silver should be covered with crushed charcoal so that it does not get stiff. If you take from the crucible any quantity, be it 1, 10 or 100 dirhams, and refine it in the rūbāṣ[4], you will always obtain 1 part of silver and $2\frac{1}{3}$ parts of copper, according to the first adjustment. Ten dirhams,

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1) for the spelling of this term see Mq., Sulūk, ed. Ziyada, i. p.506, ftn 6

2) hubūb al-ʿiyār ? additional quantity of silver or copper ?

3) If every 30 dirhams lose 1 dirham in the fire, requiring thus 1 additional dirham to maintain the standard, then 6000 dirhams, losing 200 dirhams, require 200 additional dirhams.

4) in distinction from rūbās with sīn or rūbāsh, rūbāṣ with ṣad, seems to mean refining. Cf. Dozy, i. 564. See below fo.8r (p.204)

for instance,should produce 3 dirhams of silver.But this proportion cannot be achieved without the addition of the hubūb al-nār.

Subsequently a moulder removes with iron tongs the small crucible containing the dissolved silver and copper,from the fūtaqa in the furnace,and pours the substance on top of a wooden cupola in the shape of helmet,which stands in the middle of a jug filled with sweet water.The top of this cupola is covered with a little crushed charcoal.This causes the liquid silver,which is poured on the cupola,to become round and to fall into the water.In the jug it takes the shape of irregular,smaller and bigger pellets.Close to the moulder stands another worker holding crushed charcoal. He scatters it on the cupola whenever the moulder pours out the silver. This method prevents the drops from sticking to each other and gives the pellets correct shapes.Afterwards the pellets are collected from the bottom of the jug,washed from the coal dirt and dried outside.Next step consists of testing the standard of the waraq flans.

(p.204)

-fo 8r - Chapter Fourteen on testing the standard of the waraq dirhams.Dissolve 2 raṭl of lead in a crucible made of the compound consisting of $\frac{1}{3}$ lime and $\frac{2}{3}$ ash .Take 15 dirhams weight from the whole lot of alloyed waraq dirhams and melt it down in the same crucible under the rūbāsh.The rūbāsh is a kind of bellows turned upside down so that the blast coming from their mouth reaches the middle of the crucible. (p.205).

The lead attracts copper contained in the silver.This copper takes shape of a cake,in the middle of which lies a small cake of silver.In the middle of the latter is yet another cake of lead which has turned جنبارا[1] Subsequently place the cake of silver into another crucible of fresh compound and start blowing again with the rūbāsh,until the lead,still remaining in the silver,has been burnt.The size of the cake with lead in its middle has been reduced.You eject the lead again.You then place the cake of silver in yet another crucible and repeat the same operation.When the silver has become free from both lead and copper,you should ascertain its weight,and if it is amounts to $4\frac{1}{2}$ dirhams weight[2] or more,then the standard of the warag alloy is correct.The next steps are carried out by the minters who hammer these flans,(p.206),polish and finally stamp them.

Chapter Fifteen on polishing warag dirhams.Boil sharp vinegar[3] in a copper vessel and having heated the dirhams, dip them in that vinegar.Rub them with salt until they cease to be black and become white.Rinse them with sweet water in

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1)see ftn on p.157

2)notice the mistake of ibn Mammātī in his description of a similar process.Kitāb Qawānīn,p.333

3) khall - vitriol ? Cf.Sigelī,Decknamen in der Arabischen Alchemistischen Literatur,p.39

a wooden dastār and rub them with wood of sumaq tree,until the whiteness intensifies so that their colour resembles that of pure silver.[1] Dry them with bran and when you have finished it,clean them from bran.Thereupon you can proceed to stamp them with a die.

Chapter Sixteen on the extracting of the silver residue from the furnaces,crucibles and the earthy compound,by means of amalgamation with mercury.Take crucibles used for melting the waraq alloy,crush them adding water,and place 2 wayba of this pulp,together with 6 artāl of mercury, in the grinding stone.Turn the stone for half a day.Fill the stone with water, - 8v - shake it and remove the stone.Pour the whole of the water (p. 207) and of the earthy compound at once,so that the mercury and silver remain in the stone.Squeeze them with a piece of parchment,so that the mercury comes out.Fill $\frac{2}{3}$ of an earthenware mug with the nuts which remain in the parchment and the rest with broken potsherds.Place this mug in a jug filled with water.Make a fire behind the mug,so that the mercury condenses in the jug with water.The waraq alloy,obtained in this way, is then refined with the rūbāsh,to destroy copper which is in its body.Only then the silver is rendered pure.

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1) for this method of whitening flans containing copper,cf Luschin von Ebengreuth,Allgemeine Münzkunde.,p.60

There are differences of opinion concerning this method. One rule is that gold and silver residue must not be put together in the grinding stones.

Chapter Seventeen on the staff of the mint and their duties Al-mushārif,he is responsible for the gold and silver produced in the mint,as well as for the tools and standards of measures, dies and instruments.He must seal the furnaces and compare the degree of purity of the precious metal (p.208) with the accounts.Al-shāhid,his duty consists in supervising the activities of the mint and checking the accounts.Al-naqqāsh ,his hand must be sealed to ensure his loyalty.The engraving of dies is to be his exclusive occupation.This increases his skill and makes the dies difficult to imitate.Workers must not approach a new die.Al-muqaddam,he protects the maintenance of the official standard of gold and silver.He can achieve this if he knows the standard of every lot of raw material delivered to the mint, the loss suffered by the haraja in the refining process and the necessary adjustments giving this haraja the official standard. Thus he prevents the substitution of sub-standard unstamped raw material for the tested haraja,which fraud might happen when the haraja nears the official standard.This causes a loss to the dīwān.It is possible,for example,that the owner of the raw material has a die with which to mark at home.[1] And if he is not

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1) for coining outside the mint,cf.Blochet,Histoire d'Egypte de Makrizi,p.399.ftn

prevented from doing that,he may mark the haraja himself,avoiding the payment of tax,normally levied by the dīwān on raw material passing the mint (p.209).This cannot happen if there is somebody knowing the methods and taking care of furnaces.It also may happen that Greek gold,stolen from the khums,is placed in the furnace instead of the Islamic gold.If the mint-workers ignore it,the dīwān is deprived of the tax which is imposed on the imported gold.[1] - fo 9r - If the muqaddam negligently seals the furnace containing a crucible,such negligence creates various possibilities of abuse.Thus it is possible for the owner of the haraja to make at home check and test plates.But while he makes the test plate of pure gold,he adds something to the check plate.He provides them with marks imitating those of the minters,and seals the cup with a stamp resembling the stamp of the mint.(p.210).He then secretly places his cup in the furnace.When the minters test the standard of that haraja they find in the furnace the cup left by the owner of the haraja. When the plates are checked the haraja-plate shows the official standard.In this way the haraja is ordered to be stamped,although it is defective.The owner of the haraja may also steal a test cup from the furnace.He opens it and by breaking a bit of the check plate makes its weight equal to the test plate.He stamps the cup appropriatly and puts it back to the furnace.When the contents of the cup are tested,the weight of the test plate ag-

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1)see above p.116

rees with the check plate.The haraja is consequently stamped, although it is deficient.He can also mix 1 qīrāṭ of crushed golden silver with clay and besmear with it the bottom of the crucible in which the check plate is placed.(p.211).In the process of melting,the silver mixes with the gold,so that the standard of the check gold is lower than that of the haraja plate.As for the standard of silver,three rules should be observed.Silver can only be refined in the presence of the ʿudūl and under the control of the muqaddam.The same applies to the reduction and folding of silver.If the silver splits then it must be refined again.The weighing of silver and copper,and placing them in the furnace can only be carried out in the presence of the muqaddam.He must be there until the furnace is emptied and must see that nobody,apart from the moulders,approaches the furnace.This prevents the adding or substracting of copper in the adjusting process.Finally the last and the most important consideration concerning the methods of safeguarding the standard. - fo 9v - A mistake in the process of alloying silver with copper,committed in the melting,cannot be traced by checking the standard.The muqaddam must,therefore,be on guard (p.212) against nine defects at the time of adjusting the standard ;

1) - he must beware of the appearance of the ṭūb ,I mean the sand and lime,in the compound

2) - it should not appear in the crucible

3) - nor in the rūbāsh

4) - or in the iron ladle which is used for skimming off

5) - he must beware of coal adhering to the surface of the cast

6) - he must beware of defects arising from heating silver in one operation only (it should be heated twice,the first fire being drier than the second,and the second hammering stronger than the first) when silver is purified from copper and iron [1)]

7) - the silver must be dipped only in salt,vinegar,and rubbed only with sumāq,so that all its whiteness appears.

8) - not to apply defective dies to coins

9) - the correct assessment of copper should be made before it is thrown into the crucible.

If the weight of silver proves defective in the process of adjusting then the muqaddam is held responsible for that.But if a mistake occurs in the course of melting,then the moulder is charged for the loss.

(p.213)

Completed on 12 Dhī al-Qa^{c}da A.H.1135

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1) al-Aḥmar -iron,and al-aswad -copper,cf.Sigell,Alchemistische Decknamen,pp.34 and 35 respectively.

Chapter XV

ARABIC COPY OF THE MANUSCRIPT

بسم الله الرحمن الرحيم. هذا كتاب فى كشف الاسرار العلمية بدار الضرب المصرية صنعة منصور بن بعرة الذهبى الكاملى رحمه الله. اما بعد. فانى قد جمعت فى هذا الكتاب من اسرار عمل الدينار والدرهم بدار الضرب ما لا غنى[1] عنه لمتوالها من معرفته ولا بد من مقدمات العمل به قبل مباشرته والا فلعلك لا تسترجع فائته ولا تستدرك فرط ما فيه ويكون الضرر فيه اضعاف منفعته. فان دار الضرب مامّ[2] اسرار المملكة وناموس السلطنة ونقود العالم. وهى الّم بيوت الاموال. والتحرير المستقر فيها لموازين الاعمال والصراط المستقيم الذى لا يجوزه[3] الا الأمنا المخلصين من النساء والرجال. فاليها ينتهى غاية الامتحان. واعلم ان مجرى الذهب والفضة لا يثبت فى تعليقها الا الحق الخلص لا المغشوش. وضرب الله الامثال بقوله كذلك

1) mss. غنآ
2) ms. فايته
3) mss. ملى
4) ms. يحوزه

يضرب الله الحق والباطل فأما الزبد فيذهب جفاء
وأما ما ينفع الناس فيمكث في الأرض. ففيما
نطق الكتاب العزيز[1] دليل على ان الباطل
يتلاشى[2] للفناء والاضمحلال وان الحق يبقى
ويستقر بقاؤه ولا يخطر الغير خلوصه في بال.
فسبحان الله الذي لا يقبل من عباده الا الخالص من
الاعمال. وقد رتبته سبعة عشر بابًا في ضوابط اصول
العمل التي عليها[3] العمدة واليها المستند. ومنها
ينكشف للحاذق دقائق اسرار عملية تخطر له
من قبل في خلد. ولو دونت لك ذلك لا طنبت
واحرجت من الاكثار عما اليه من الاختصار.
واردت ترجمة الابواب التي[4] اذكرها:
والله تعالى الموفق للصواب الباب الاول في استخلاص
الذهب والفضة الذهبية التي خلقها الله في
جسمه[5] من المعدن خلاصا كليا محررًا

1) Q. XIII, 18 2) ms. يتلاشا 3) ms. اليها
4) ms. الذى 5) ms. خسسة

ليعود ذلك الذهب اصلا يستند اليه كالذهب
الآمرى[1] من غير زيادة ولا نقصان. وسلكت فى
خلاصه طريقا يشهد بصحة البرهان. وذكر خواصه
ومنفعته. بعون الله تعالى الباب الثانى فى معرفة
نقود الذهب المختلفة الشكل ومبلغ كل نقص
منها عن العيار المصرى قبل التعليق وبعد
التعليق. الباب الثالث فى معرفة عيارات تعرف
بها كل صنف من الذهب الخشن[2] وغيره
بالمحك والمى. وبالله التوفيق الباب الرابع فى معرفة
تعليق الذهب وترتيب آلته وبناء اتونه ومخلوطه
وترابه وصفة وقيده ومقدار فعل النار فيه على
حكم الاختيار تقريبًا لا تحريرًا. وبالله التوفيق
الباب الخامس فى معرفة اعتبار المرجة وهل
بلغت الى حد الجواز لتختم دنانير او ردت ومعرفة
ما ردت به من النقص محررًا بالاجزاء من جنسه.
وبالله التوفيق الى سواء الطريق الباب السادس فى
معرفة جلا

1) ms. الاميرى 2) ms. الخشر

الذهب اذا جاز ليختم عليه بالسكة دنانير.
الباب السابع فى معرفة تعديل كل هرجة من
الذهب وما تحتاجه من النقص فى التعليق
ليبلغ الجائز من غير حيف ولا نقص. الباب
الثامن فى استخراج ما فى تراب التعليق
من السرسيم او الفضة الذهبية التى تتصعد من
جسم الذهب فى وقت تعليقه لضعفها من
ملاقاة النار وعدم ثبوتها مع الذهب وقلة صبرها على
الوقد. الباب التاسع فى تصفية الفضة والنقرة
الخشنة[1] بالرواص ليصير طلغما وحريق ما فى
جسمها من النحاس بالرصاص وصفة مجلو[2]
ترابها التى تروبش. والله اعلم الباب العاشر فى
صفة عمل الدراهم النقرة الصحاح وتحريرها. وبالله التوفيق
الباب الحادى عشر فى معرفة جلاها وختمها دراهم
وانصاف وغير ذلك. الباب الثانى عشر فى استخراج
الفضة النقرة التى تختلف مع النحاس وجسم

1) MS. الخشر

2) sic !

الرصاص الذى يسمى حبق وقت التصفية
بالروباش . الباب الثالث عشر فى تعديل سبك
الدرهم المصرية ورقا من النقرة المصفية والنحاس
الاحمر المنشف . وبالله التوفيق الباب الرابع عشر فى
اعتبار عيارها بالروباص خشية الخلط وقت التعديل .
الباب الخامس عشر فى جلاها وختمها بالسكة
قراريط وقطع وغير ذلك . الباب السادس عشر
فى استخراج ما يتخلف[1] فى الاكوار والبواتق
والتراب من الفضة الورق فى حر السبك وما
يحتاج من الزيبق . الباب السابع عشر فى
ذكر ما يلزم كل واحد من مستخدمى[2] الدار
بمفردة وشرح من اى جهة يدخل التلبيس ليتحرز
منه .

1) ms. يتخذف

2) ms. مستخدمين

الباب الاول

فى استخلاص الذهب من الفضة التى خلقها الله تعالى فى جسمه من المعدن خلاصًا كليا محررًا ليعود ذلك الذهب مختارا يعتمد عليه واصلا يستند اليه كالذهب الآمرى[1] من غير زيادة ولا نقصان بطريق يشهد بصحة[2] البرهان.

وذلك ان ملوك مصر المتقدمين كانوا يعملون الذهب بدار الضرب بلا عيار يستند اليه ولا اصل يعتمد عليه. فتارة يعلو عيارهم وتارة ينزل. وهم لا يعلمون. حتى ايتهى الملك الى الآمر الذى عرف به الدينار الآمرى[3] العال. وهو احد ملوك مصر ولد بالقاهرة المعزية ليلة الثلاثاء الثالث عشر من المحرم سنة تسعين واربعمائة وتولى الملك وعمره خمس سنين وشهر واربعة ايام. وأمعن الكشف فى اسرار عمل الذهب بدار الضرب سنة اربع عشرة[4] وخمسمائة. ودقق

1) ms. الاميرى 2) ms. بصحتها 3) ms. الاميرى

4) ms. عشر

البحث عن ذلك ووقف من اسرار الذهب على
اصل لا يجوز لغيره ان يتعداه وبالغ في الاستقصاء
عنه الى حد لم يصل اليه سواه وصار قدوة يقتدى
به من بعده وعيارا قد استوعب الممكنات في
التحريز وهو العمدة ولا الوقوف الا عنده. ولما علم
مولانا السلطان الملك الكامل علو الدينار عن الآمرية[1]
اراد بعلو همته البروز عنها وحيف عيار الدنانير
المختومة باسمه عن الآمرية[2]. وهي اعلا منها ولا في شرق
الارض ولا مغربها دينارا اعلى من عيار الآمري[3]
الكاملي. وصفة التسلط للآمر[4] رحمه
الله تعالى لهذا العمل انه وجد اصناف الذهب
ثلاثة. وهم معدني وتربة ونبات. فاما المعدني

1) ms. الاميرية 2) ms. الاميرية

3) ms. الاميري 4) ms. للامير

فهو الذى خلقه الله تعالى فى البحر يشبه العروق
المفرعة فيه . وهو بالمغرب . واما التربة فهى التبر
المشبه بالجص والرمل . واما النبات فهو الذى ينبت
فى بحر النيل خلف جبل القمر . ولطيف هذا
النبات يحمله النيل الى ارض اسوان [1] يجمع ترابها
منه وهو ظاهر فى الغبار الاسوانى اذا تأملته كالدر
اللطيف . ولطيف هذا اللطيف يحمله النيل من اسوان
الى بحر مصر تراه ظاهرًا فى الرمل لمن يتأمله بشاطئ
بحر مصر الا ان لا يقى بما يغرم عليه من العمالات
بضعفه وترازينه . واما الذى لا يقدر النيل على حمله
ويبقى مستقرًا [2] فى مكانه وهو كالجص المستطيل .
وهذه الاصناف . اول ما تطلع فى معادنها وتظهر
فضة ملونة بذهب . ثم يقوى الذهب فيها
على الفضة اولا فاولا على قدر قوة نجار معدنها

1) ms. سراسر
2) ms. مستقر

فيصل منها الى دار الضرب ما يكون خالصًا[1] قد
انضجته الطبيعة وكملت مزاجه. ومنها ما يكون
ذهبًا دون لم ينته فى الطبخ الى غايته. والذهب
اكثر مخلوقات الله من جميع المعادن فانه باق
على ممر الزمان فى كل ارض وجهة ويزيد فى
كل يوم ما تنبته الطبيعة فى معادنه. وسبب قلته
فى ايدى[2] الناس فرط محبتهم فيه واشفاقهم عليه
وادخارهم له واكتنازهم اياه. ثم تعرض قاطع الموت
لاصحاب الذخائر[3] والكنوز فتخفى بموتهم. ونعود لما
كنا فيه. فجمع الآمر[4] من هذه الاصناف الثلاثة
من الذهب ثلاثة اجزاء متساوية وسبكها سبايك
ورققها وقطعها كالاظفار وعلقها فى اتون دار الضرب
كما جرت العادة ليلة واحدة واى صنف حضر

1) ms. حايفا
2) ms. يدى
3) ms. الذخاير
4) ms. الامير

من هذه الثلاثة قام مقام الجميع .واوقد[1] عليه بنار الفحم السنط القوية فاذابت النار ما فى جسمهم من الذهب والفضة التى خلقها الله تعالى فى جسمها وقصرت الطبيعة عن نضجها حتى تعود ذهبا .ولم يذب[2] الذهب وصبر على النار لكمال طبيعته وتماسه بل نقص من وزنه مقدار الفضة التى[3] فارقته فى التعليق للنار لضعف جسمها ونقص كمال طبيعتها . فتستخرج تلك الفضة من تراب التعليق بالحيلة التى يأتى ذكرها . وتحقق وزنها وتكتب عليها فضة تعليق اول ليلة ثم تعلق الذهب بعينه ايضا ثانى ليلة . وتفعل فى استخراج الفضة من ترابه والكتابة على كل فضة تستخرجها على التوالى كالليلة الاولى او الثانية وكذلك ثالث ليلة ورابع ليلة الى ان

1) ms. ووقد 2) ms. يدوب

3) ms. الذى

يخرج منه فى تراب التعليق عوضا من الفضة
سرسم[1] فحينيذ ترجع الى فضة تعليق اول
ليلة ويجعل عليها من الفضة الغير الذهبية مثل
وزنها وتضيف[2] الذهب الاول بالسبك وترقه
وتقطعه وتعلقه ليلة وتخرجه بالغد. وتحرر وزنه
بعد الزرد فان كان نقصه اقل من مقدار الفضة
المضافة اليه. ثم تخرجه وتغربله من تراب
التعليق وتزرده وتضيف اليه فضة تعليق
ثالث ليلة وعليها مثل وزنها فضة غريبة.
وتسبك الجميع وترققها وتقطعهم كما جرت
العادة ليلة كاملة. وكالعادة من الغد تخرجه
وتغربله وتزرده[3] وتحقق وزنه فان كان قد
نقص مقدار الفضتين المضافتين[4] اليه والا تعيده
الى التعليق حتى ينقصها. تفعل به ذلك حتى

1) sic !
2) الى
3) ms. ترده
4) ms. المضافة

يستوعب معه فى ذلك التعليق جميع الفضة
المكتوب عليها على التوالى الى السرسيم ١. وعليه
وزنه فضة غريبة وتسبك مع الذهب. وتعلقه
كالعادة وتخرجه بالغداة. وتغربله منه التراب وتزرده
وتحرر وزنه | فان كان نقصه مثل الفضة والسرسيم
الذى فيه محرر فقد خلص من الفضة خلاصا تاما
كليا. وذلك ان كلما تردده الى النار فى التعليق
لا يثبت الا الذهب الخالص الناصع الكمال طبيعته.
وتفارقه الفضة المخالطة قهرا ومعها اليسير من
الذهب الضعيف القوة الذى لم ينته ولم يبلغ.
وبهذا سميت الفضة الخارجة منه التى لو بقيت
فى معدنها صارت ذهبًا فضة ذهبية. واعلم
ان الفضة الغريبة اعنى الفضة الغير الذهبية
تستجذب جميع ما فى بطن حسم الذهب من
الفضة الذهبية لتجانسها فى الفضة وينفصلا عن
الذهب ويخلص الذهب منها من غير حيف

١ sic !

تردده ms.

ولا نقص فى الغيار. وقد وقف على حد معلوم
لا زيادة فيه ولا نقص ان برهان ذلك انك لو
عملت هذا العمل المقدم ذكره: فى اربعة اقداح
بأوزان متساوية. فى كل واحد منهم من الذهب
والفضة والتراب والنخال والطين مساو للآخر
وعلق الجميع فى وقت واحد واوقد عليهم
وقيدًا واحدًا بحيث لا يكون بعضهم فوق بعض
ويحاذيهم العمل متتابع الى حد الكمال خرج الجميع
عيارًا واحدًا محققًا محررًا على ان الذهب الذى
تحققت عياره وخلوصه من الفضة لو علق بعد
ذلك مرة او مرارا لم يخرج منه فى مرات
التعليق سوى الذهب الدون. وكلما زدته
تعليقا خرج منه الذهب فى المرة الثانية اعلى

عيار واحد محققا محررًا ms. ع فى وقت واحد وقد عليهم ms. ل

الدور ms. ع

من الاولى والثالثة اعلى من الثانية والرابعة اعلى من الثالثة فى التعليق الى ان يقف المثقال على حد معلوم لا يقبل النقص ابدًا ويَصْبِر[1] على شدة النار وقوتها ويثبت فى التعليق وقد عاد مثقاله ثلث وربع مثقال ثم بعد ذلك لا ينقص فى التعليق ابدًا ابدًا ابدًا.

ومن خواصه اعنى الذهب الذى بلغ فى الخيف الى اربعة عشر قيراطا. انه اذا سقى منه الملسوع بالأفعى ابرَاه من ساعته وفعل فعلا اضعاف فعل المارهر الحيوانى. واذا سقى منه لمن سقى السم ابراه وكف عنه فعل السم من التصرف فى الجسم. واذا خشى[2] منه الحبّة الردية والجُرح الخبيث أبرأه فى ايسر وقت واقربه[3]. واذا عمل مثقال فى الفم نفع من الرجيف وشجّع وقوى

1) sic!

2) ms. خشى

3) ms. افرسه

القلب. وكل ما ذكرناه من منافعه ان كان محلولا منشفا مثل الكحل انه يجف الذهب في السبكة بعقيقه [1] مسحوق ثلاث دفوع فانه يتكلس فاسحقه على صلاية مانع وبفهر من جنسها مانع حتى ينعم. ثم يرفع في اناء زجاج لوقت الحاجة اليه نفعه نفعا. وشاهدته غير دفعة انه من تعرض للكتابة بالذهب المحلول على الكاغد [2] وهو جنب ان الذهب لا يثبت ويتطاير من الكاغد [3]. واذا سبك [4] التبر اول مرة يطلع على وجهه وسخ اسود يسمى اصلها ينفع من الامراض الخطرة في العين ويقوى النظر. وخاصة [5] اذا اكحل به. وقد يخرج على وجه الذهب الغير تبر في بعض الأحايين في حال السبك اقليميا ذهبية ولكنها غير نافعة

1) ms. بعقيقة مسحوق
2) ms. الكاغض
3) ms. عن الكاغض
4) ms. اسبك
5) ms. خاصيته

ولعلها فى فعلها عكس[1] فعل اقليم التبر. واذا تعطل حمل شجرة كانت وقل ثمرها فسمر فيها مسمار من الذهب وزنه سُدس مثقال فانه تحمل ويكثر حملها اكثر مما جرت به العادة باذن الله تعالى. وكل كى يكون سبيكة ذهب فانه لا يفتح ابدًا. وكل طعام يطبخ فى قدر ذهب نفع جميع الامراض القلبية ويشجع مُنزِمنها[2]. واذا سبك الذهب وقلب فى ماء دفوع[3] ينتفع من الرجيف لمن شربه. ويوافق الافلاط السوداوية وازالتها. وقد علمت انجذاب النفوس اليه وتأنسها به بخاصية ركبها الله فيه.

فصل فى استخراج الفضة الذهبية من تراب التعليق كل ليلة بمفردها لتميت الباب الاول يتخذ لذلك صلاية مقعرة من حجر مانع وفهر

1) ms. علس 2) ms مد منها 3) sugg. a numeral 3-10 before دفوع

(fo 4r)

مانع كابير ملئ[1] اليد. ثم تجعل فيها تراب التعليق
اول ليلة بمفردها وتنديه بقليل ماء وتسحقه بالفهر
سحقا قويا الى ان تحقق نعومته فيجعل عليه من
الزيبق ما اردت وانت ملازم السحق الى ان تعلم
ان جميع ما فى جسم ذلك التراب من الفضة قد علق
بالزيبق. فعند ذلك تفيض عليه من الماء وتغسله
وتصفى عنه الماء. وتحترز ان لا يخرج من الزيبق
فى الماء شئ. ثم تجعل الزيبق فى رق و تلويه ليّا
قويا وتعصره فيخرج الزيبق من اجسام الرق وتبقى
الفضة كالجوزة فاجعلها على شقفة فوق النار فان
الزيبق الذى قد بقى مع الفضة يفارقها. ثم تسبك[2]
وتعرف وزنها وتكتب عليها فضة تعليق اول
ليلة. ثم تفعل بجميع الاتربة كذلك على التوالى.

1) ms. ملو 2) ms. تسبكه

اعلم ذلك والله الموفق للصواب .

الباب الثانى

فى معرفة نقود الذهب المختلف العيارات والشكل ومبلغ نقص كل نقد منها عند العيار المصرى. فى التعليق . الصورية[1] نقصها فى التعليق حتى تلحق بالعيار المصرى فى كل مائة مثقال مثقالين و نصف. ودرسم واجب لصكة واحدة ضرابين خمسة . الباقى اثنان وتسعون ونصف. قيمة كل مثقال سبعة وثلاثين درهما ورقًا اذا كان الصرف اربعين بدينار. ويفضل بعد ذلك ما نقص فى تراب التعليق وهى ثلثى المثقال ونصف سرسيم والثلث الآخر يتلاشى. واعلم ان الذهب اذا كان عال مثل اليعقوبى لا يخرج منه فى تراب التعليق الا ذهب سرسيم . واذا كان ذهبًا دونا لا

[1] ms. اليغبوريه

يخرج منه الا فضة ذهبية. وكلما يخرج فى تراب التعليق
من نقص الذهب مثقاله وزن ثلثى مثقال لاغير والبقية
تتصعد[1] وتتلاشى[2] وتهلك من قوة نار السبك[3]. تعليق
دمشق[5] نقصها فى التعليق من كل مائة مثقال خمسة
مثاقيل. ودرسم والصكة والضرابين خمسة مثاقيل. الباقى
تسعون مثقال. قيمة كل مثقال ستة وثلاثين[6] درهما
بالصرف المذكور. المستخرج من تراب تعليقها سرسيم.
وفيها ما يكون نقصها فى التعليق {اقل من ذلك
على قدر محكها وقيمتها بالنسبة للمظفرية ضرب اربل[7]
نقصها فى التعليق}[8] من كل مائة مثقال احد عشر
مثقالا[9]. ودرسم الصكة واجرة الضرابين خمسة دنانير[10].
الباقى اربعة وثمانون[11] مثقالا. قيمة كل مثقال ثلاثة
وثلاثون درهما ونصف بالصرف المذكور. المرابطة

1) ms. يتصعد
2) ms. يتلاشى
3) ms. يتهلك
4) ms. النار السبايك
5) ms. دمس
6) ms. ثلاثون
7) ms. ازبل
8) {-} on margin
9) ms. مثقال
10) and not ? مثاقيل
11) ms. ثمانين

مثل ذلك. التابكية نقصها فى التعليق خمسة عشر
مثقالا[1] من كل مائة. ورسم الصكة واجرة الضاربين
خمسة. والباقى ثمانون. قيمة كل مثقال اثنين وثلاثون[2]
درهما بالصرف المذكور. النورية[3] نقصها فى التعليق
عشرة مثاقيل. واجرة ورسم خمسة. الباقى خمسة
وثمانون. قيمة كل مثقال اربعة وعشرون درهما
بالصرف المذكور. الدوفية نقصها ثلاثون مثقالا
من مائة. ورسم واجرة خمسة. الباقى خمسة
وستون[4] مثقالا. قيمة كل مثقال ستة وعشرون
بالصرف المذكور. والذهب المسوخ بالفضة قيمته على
محكه. وهذه مقالات واضحة فى معرفة القيمة. وبالقليل
يستدل على الكثير. واما الذهب الخشن[5] فلا
يعلم نقصه فى التعليق الا الله سحانه وتعالى.

الباب الثالث

فى عمل عيارات تعرف بها قيمة كل صنف من

1) ms. مثقال 2) ms. اثنين وثلاثين 3) ms. التورية
4) ms. ستين 5) ms. الحشر 6) ms. يعرف

الذهب الخشن[1] وغيره بالمحك بعد الحمى[2]. يؤخذ
مثقال الا قيراط ذهب جائز[3] خالص[4] عال يجعل
عليه قيراط فضة ذهبية[5] ويسبك بسبكة وينقش
عليها عيار ثلاثة وعشرين قيراطا. ثم تأخذ[6] اثنين
وعشرين قيراطا من الذهب العال ايضًا و تجعل عليه[7]
قيراطين فضة وتسبكها كالاول وتنقش عليها
عيار اثنين وعشرين قيراطا. تفعل ذلك وأنت تنقص
الذهب قيراطا قيراطا وتعوضه فضة وتنقش عليه
مبلغ عياره الى ان ينتهى الى ربع رباعية فضة
ورباعى ذهب[8]. وعدة هذه العيارت ثمانية عشر عيارا.
وزنها ثمانية عشر مثقالا فيها من الذهب عشرة[9]
مثاقيل ونصف وربع وثمن. ومن الفضة الذهبية سبع

1) ms. الحشر 2) ms. الخمير 3) ms. حايز
4) ms. حايف 5) ذهبية فضية 6) ms. يأخذ
7) ms. عليها 8) ثلاثة اربع فضة و ربع ذهب؟
9) ms. عشر

مثاقيل وثمن. هذا العيار غير الجائز. والجميع متقوية مسكوكة فى قلب فضة مع المحك على التوالى[2] اولهم الجائز واخرهم عيار رباعى. فاذا وقع لك ذهب مجهول[3] تحكه على جانب العيارات المقدم ذكرها فيظهر لك من كونه ولونه شبيهه من العيارات مبلغ قيمته على الوضع الصحيح المحرر بعد الحمى. فانه ربما كان فى جسمه نحاس. فيكون لونه على المحك احمر عال. وهو ناقص فى العيار. وهو اذا حمى تغير لونه وركبه سواد وغيره على قدر ما فيه نحاس من الكثرة والقلة. فافهم ذلك واعمل عليه تصب ان شاء الله تعالى.

1) ms. عيار 2) ms. التولى 3) ms. ذهبًا مجهولًا

الباب الرابع

فى معرفة تعليق الذهب وصفة بناء الاتون.

يبنى قبة داخلها مدور وخارجها مربع. عرض أرضها اربعة اشبار فى اربعة اسبار خارجًا عن عرض جدرانها بالطين المر والملح. كلما بنى[1] مدماكان ليّس داخلها بالطين والملح الى حد قطب القبة. فتختم ببربخ فخار لطيف مفتوح لتنفس النار منه. ويكون لها باب كباب الفرن وله طابق فخار بافريز مفروض فى البناء. وتكون أرض القبة مرتفعة عن الارض مقدار مدماكان. طوب. صفة عيارات تراب المخلوط بعيار الذهب. يؤخذ من الطوب الاحمر الهش الجديد جزء ويدق ناعما. ويغربل ويخلط الجميع كيل واحد ملح وكلين[3] ويندى بقليل ماء. صفة تعليق الذهب

1) ms. بنا 2) ms. يكون 3) ms. كلين طوب

يؤخذ من هذا المخلوط ويوضع فى قدح فخار احمر
وتجعل فيه الذهب مرققا مقطعا كالاظفار زراقة
ذهب وزراقة مخلوط مِلئ [1] القدح وركب فوقه
قدحًا آخر. وشدّ وصلها بالطين. وتختم على الطين
خوفا من عارض. ويودع وسط الاتون فوق لبنة
اخرى وقدح مكبوب ان كانت اقداحًا كثيرة.
فى كل واحد منها ذهب مخالف للصنف الآخر.
فليجعل ابدًا قدح الذهب العال فوقه ليقابل البار.
ويصبر على حرّها وقدح الدون اسفل. وهو ارفق
به وقطع النار فيه اقل. ثم تجعل قرم الصنط [2]
ملاصقة حيطان القبة والاقداح فى وسط القبة. ثم
يوقد بها الى أن يشعل ويسد بابها بالغطا من اول
الليل الى الثانى من النهار. فيفتح الاتون ويخرج
منه ما فيه ويفك الختم عن القدح ويغربل ما فيه

1) ms. ملوء 2) ms. الصنط

بغربال يجلس تحته قصرية فخار. ويحتفظ بالتراب ليستخرج ما فيه من الفضة. ويحقق بالميزان ما نقص من الذهب في تلك الوقدة. ثم يعاد الى التعليق حتى يعلم انه قارب الجواز. فحينئذ يحك منه قبالة الجائز فان كان لونه كلونه فيعمل له عيار وان كان دونه ردّ الى التعليق حتى يلحق الجائز.[2]

الباب الخامس

في اعتيار[1] الهرجة. يسبك الذهب الذي علق بسبائك ويقطع طرفي كل سبيكة وتسبك[4] الاطراف جملة. ثم يؤخذ منها وزن مثقالين. ثم يضرب منه ورقين مساويين في القدر والوزن. ويضرب من الاكرى الذي هو الاصل مثلهما[5] والوزن على قالب فولاذ[6] هذه صورته, ثم يصور في النسخة. ثم يجعل الاربعة اوراق في القدح على

1) – 2) on margin. 3) ms. عيار, but on p. اعتبار

4) ms. يسبك 5) ms. مثلها 6) ms. فولاد

المخلوط متقابلات والمخلوط فوقهم . ثم تجعل[1] اوراق
الاصل[2] وهما فوقهم فى القدح بعينه . فتغطيهم بالمخلوط
متقابلات وتكتب عليه قدح العيار . وتشد الوصل
كما جرت به العادة وتختم عليه بالطين ويودع
الاتون اللطيف[3] اعتد برسم العيار . وتوقد عليه
يومًا وليلة . ثم تخرج[4] اوراق الاصل والفرع
وتمسح كل ورقة منهم على لوح خشب بخرقة صوف
مسحا يزيل الشك والوهم . ثم تعلق[5] عيارات التعليق
عليهم . ويكون قد حرر وزن الاوراق بالمثقال والحبوب
من قبل لتعلم ما قطعت النار منهم ومقدار ما
زدت به الهرجة من حبة . ثم يقابل باوراق الوزن فى
كفتى الميزان فان رجح عن الاصل ولو بعُشر حبة فقد
جازت تعمل دنانير وتختم بعد جلاها . واعلم انه

1) ms. يجعل 2) ms. الاوراق الاصل 3) ms. ايتوان لطيف 4) ms. يخرج
5) تعدل ؟

متى عمل اوراق اصل برسم العيار من دينار آمرى[1]
واعتبر العيار على ذلك. فربما لا يجوز الهرجة ويحتاج
الى تعليق ثان[2] وتجديد ضرب وعيار وهذا فيه
خلاف وعسره ذلك وذلك ان اختلاف عيارى
الاصل تؤثر الهرجة ونقرها والواجب لمن يجعل
الارض سكة واحدة فاذا احتيج للعيار اخذ من
تلك السكة بقدر الحاجة وعاير عليه | فان زدت
الهرجة واحتيج الى عيار ثان[3] كان عين السكة
حاضر[4] فيعاير منه مُطَمْئِنٌ[5] من الخلاف فى العيارات
فافهم وبالله المستعان وعليه التكلان

الباب السادس

فى جلاء الذهب ليختم. يجعل[6] بعد تدويره فى
قدح فخار احمر. وتجعل ملحا مدقوقا سندى بقليل ماء
حلو. وتوقد عليه بنار الحطب القوية الى ان يدور

1) ms. آميرى 2) ms. ثانى 3) ms. ثانى
4) ms. حاضر 5) ms. طمين 6) الذهب ؟

الملح كما يدور الرصاص ويجرى ويقلب سبايك
فتخرج الدنانير منه. وتغسل بالماء البارد والرمل
الناعم وتجفف[1] فى قدح على نار لطيفة وتختم[2].
ومتى لطخت القوبة بهذا الملح ابراها باذن الله تعالى

الباب السابع

فى معرفة تعديل كل هرجة من الذهب وما يحتاج
من الذهب من النقص فى التعليق ليبلغ الجائز
من غير حيف ولا نقص. مثاله ان الهرجة اذا
اردت تنقص حبة فى كل مثقال وزنه مائة
فاردنا تعليقها ليلة فلا تنقص تلك الحبة.
وكما علمنا اذا علقت ليلة نقصت حبتين
فى المثقال وهذا حيف. فيتحيل حتى لا ينقص
الحبة المذكورة. والطريق فى ذلك ان تعلق
من المائة خمسين فانها تنقص حبتين فى المثقال.
ثم تجمعها بالسبك مع الخمسين الاخرى فتجئ

1) ms. يجفف 2) ms. يختم ؟ فى

حبة تنقص من كل مثقال فتعدل وعلى مثل هذا
فقس جميع الحرج. وعلم ان الذهب المنحس
اذا علق وتردد فى التعليق ويحيف ولايخلف
العيار ويكون نقصه عظيما [2] ان لم يسبك معه مثل
عشره وزنه فضة ذهبية. فان تلك الفضة تستخرج
جميع ما فى جسمه من النحاس بسهولة ويلحق
العيار بلا حيف.

الباب الثامن

فى استخراج ما فى تراب التعليق. ان كان تراب
التعليق فيه فضة فلا تجعل فى حجر السبك
سوى قدحين كيل وعليه من الزيبق عشرة ارطل
بعد تندية التراب بالماء. وتدير عليه الحجر
نصف يوم. ثم تملا الحجر بالماء وتدير عليه اربع
دورات. وترفع جميع ما فيه من ماء وتراب
وزيبق وفضة فى ماجور وتحركه يختلط الماء

1) يلحق ؟ 2) ms. عظيم

بالتراب ويرسب الزيبق والفضة. فتقطف الماء والتراب. فى ماجور آخر ويجفف فيما بعد ويقرص اقراصا ويعصر الزيبق فيخرج الزيبق من مَسَامه وتلقى الفضة كالجوزة وفيها من الزيبق ستة اجزاء ومن الفضة جزء واحد فتجعل ما اجتمع من الجوزة فى مطر فخار الى ثلثيه وتملاء[1] بقية بشقاف مكسّرة[2] وتركبه على قدر فيها ماء. ثم يوقد فوق قعر المطر فيحمى الزيبق ويقطر فى القدر التى فيها الماء. ويكون القدر فى حفرة فى الارض. فتخلص الفضة من الزيبق. ثم تعود الى الاقراص التى جففت فى الظل فتكسر وهى تسمى الاطلاق وتجعل فى مطر فخار الى ثلثيه وتملاء شقاف مكسرة[3] ويكب[4] على قدر ايضا مملوا بالماء[5]. فتوقد فوق قعر المطر ويقطر الزيبق فى القدر. فتخرج الاقراص

1) ms. تملى . 2) ms. مكسر 3) ms. مكسر
4) ؟ يركب 5) ms. ماء

يتعمل فى حبر المسبك منه أربعة اقداح وعليها خمسة ارطال زيبق وتعمل فيها كما عملت فى الفضة ١. والذى تلاشا وهلك من الزيبق فى العمل عن كل درهم فضة او ذهب وزن درهمين ونصف زيبق لا غير.

الباب التاسع.

فى تصفية الفضة بالرصاص. الفضة اذا كانت سالمت من نفس السواد واللحام وكانت كانها للغم. فامتحانها أن تبرد منها موضع. ثم تحمى ويرى الموضع ٢ المبرد. فان اسواد أو تغير فهى مغشوشة. وان لم يتغير فهى للغم. والفضة المصفية كلما ردت الى الرواص لا بد لها من النقص الا ان الثانى أقل من الاول. والذى يخرج من النقص يسمى حبق. فاما التصفية فتؤخذ الفضة وتجعل ٤ فى بوطة مقعرة من مخلوط. وصفته

١) بالفضة ؟ لا
٢) ms. موضع المبرد
٣) ms. يؤخذ
٤) ms. يجعل

النصف جير مطفى والنصف رماد مغربل تندى الجميع بقليل ماء. ومع الفضة اذا كان وزنها ثلثمائة درهم رطل رصاص. ثم تجعل عليه الفحم وينفخ بالروباش نفخا متداركا. واذا دارت الفضة اجعل" عليها حطبا. والنفخ مستمر الى ان يحترق الرصاص والنحاس ويظهر طلغما. فيخرج وينقط" على السندان بالمطرقة. ثم تحمى وتدور وهى حامية. فان لم تتفزر فقد طهرت. وان لم تقبل الدوران و تفززت ففيها من الرصاص. وتقبل الدوران على الحمى ولا تتفزر.

الباب العاشر

فى صنعة عمل الدراهم النقرة. تسبك الفضة ومهما دار منها اولا فاولا يقلب فى

1 ms. جعل تطرق ؟ ا

الدرسل بعد تغطية ما فى البوتقة من الفضة.
ان يدور جميعا فانها تنضج وتتصعد وتتحيف
وانما التوميز فى اقلابها أولا فاولا. ثم تؤخذ
السبائك فتقطع قطعا بالقسمة اكثر من درهم
كل قطعة مثاله ان السبيكة وزنها عشرون
درهما فتقطع خمس عشرة[1] قطعة وتعمل دراهم.
فاذا اختبت مائة قيراط تحرر ايضا بصنعة المائة
تحريرا ثانيًا لتصح[2] اوزانها مجتمعة متفرقة. فاذا
نقصة القطعة عن درهم فيعمل منها نصف وتجلى
وتختم.

الباب الحادى عشر

فى صفة جلا الدراهم النقرة. اذا احكم تدويرها
وتحريرها احميت واطفيت فى ماء الليمون والملح
وعركت به. فاذا ظهر بياضها جليت بالرمل

1) ms. خمسة عشر 2) ms. ليصح

الناعم الغربل . ويختم عليها بعد ان تنشف فى
النخالة وتغربل منها . والحمى يكون فى كف
حديد . والقراضة تسبك وتعمل دراهم كالعسل
الاول حتى لايبقى الا درهم واحد يسبك
ويدور ويجلى[1] ويختم عليه . وبالله التوفيق

الباب الثانى عشر

فى استخلاص الفضة من جسم الرصاص الذى
يسمى حبق . يؤخذ الحبق يدق كالفتيت
ويجعل فى بوطة مقعرة من رماد وحده مندى بالماء.
ويبنى عليها بناية[2] . صفة بربخ على طولة[3] ذراعين
ووسع قطره شبر ونصف واسفله اوسع من
اعلاه . وفيه الروباش مبنى عليه . ليس له باب
مفتوح . ثم يملأ فحم بعد دريقه بالحطب
وينفخ عليه الى ان يدور الحبق . ويجعل عليه
من الرصاص لكل قنطار من الحبق حسابا
عشرون رطلا رصاصا . فاذا استوعبه دعت

1) ms. يجلا 2) ms. (sic!) بغابة 3) ms. عالى طوله

جميع الحبق وهو علفة فحم وعلفة حبق. ثم تحققت دوران الجميع. يكون الى جانب هذا التنور خارج عنه بوطة مقعرة من جير ورماد نصفين بالسوبة منخفضة عن ارض البوطة. فيجرى جميع ما دار فيها من الحبق وغيره الى البوطة[1] البرانية والنفخ مستمرا. وعلى وجه ذلك اقليها[2] فضة كالزجاج البوليس وهو وسخ يجتمع من الحصى والرماد. فيرمى بها ويكشف وجه الحبق منها بماسك حديد. ثم يصير ذلك الحبق قرصا واحدا. فعند ذلك يهدم التنور. ويجعل مكانه بوطة أخرى مقعرة من رماد وجير مطفى نصفين بالسوبة مندى[3] بقليل ماء كما جرت به العادة. ويبنى فوقها قبة قصيرة العلو ولها باب واسع وقبالة الباب طاقة لطيفة وفم الروباش مبنى فى جنبها. وتملأ تلك البوطة فحم. وينفخ عليها ويجعل القرص على الفحم. والنفخ مستمر الى ان يدور ذلك القرص.

1) ms. البوط 2) ؟ اقليميا 3) ms. مندا

فسد باب القبة جميعا بطين رمل ولا يزال النفخ مستمرا
الى ان يخرج من تلك الطاقة المتقدم ذكرها دخان متغير
اصفر . ثم يعود ازرق وهو علامة بخارها. فتفتح باب
القبة فتجد الحبق قد نشف وصار جنبارا كالجفنة
وفى وسطه قرص وهو كالفضة النقرى فيؤخذ ثم
يصفى فى بوطة ثالثة مكشوفة بغير بناء كالتصفية
الاولى فيعود ما بقى فضة طلغم . ويؤخذ ذلك الجلنبار
ويستعمله العطارون فى دهان الزبادى وغيرها .

الباب الثالث عشر

فى تعديل الدراهم المصرية ورقا . يؤخذ لكل
صنف منها لكل جزء منها جزين وثلث نحاس
احمر غير حبوب النار . مثاله ان الالف وثمانمائة
درهم من الفضة النقرة عليها من النحاس اربعة الاف
ومائتين درهم فتصير الجملة ستة الاف درهم
وسبعمائة درهم . وعلة حبوب النار تحفظ العيار

كالعصبة 4)ms. فينفتح 3)ms. دستمر 2)ms. ورمل ؟ 1)
تحفظ 8)ms. فيصير 7)ms. العطاربون 6)ms. تستعمله 5)ms.

ثلثين درهما ولكن سقط المائتين الزايدة عن الستة الاف
فيصير سواء عليه حبوب النار لحفظ العيار ثلثين
درهما نقرة . واول ما تسبك النحاس فاذا دار
وصار كالماء الجارى ارمى عليه الفضة بعد
حماها فانها تدور لساعتها فتغطى بفحم مسحوق
خشية أن لا يفتح ويتصور علدا[1] . خذ من هذه الفوتقة
وزن درهم واحد اوعشرة او مائة وصفى بالرواص
يخرج منها جزء واحد فضة وجزان وثلث نحاس
محرر كالتعديل الاول . مثاله ان العشرة يخرج منها
ثلاثة دراهم فضة . ولولا زيادة حبوب النار لم يصح
هذا المقدار فى العيار . ثم يتناول السباك من
الفوتقة التى فى الكور ببوتقة صغيرة بالكلبتين
الحديد من الفضة الذايبة والنحاس الجارى ويقلب
على راس خشبة كالخودة قايمة فى وسط دن مملوا
بالماء الحلو وعلى تلك القبة قليل من تراب الفحم
المسحوق . فيكون ذلك سبب تدوير الفضة[2] مدحرجة.

1) ms. ويتصور علوا 2) ms. التدوير الفضة

وهى كالماء على القبة وتنزل فى الماء الذى فى الدن
فيصير نقط مستديرة كبار وصغار. ويكون الى
جانب السباك صانع اخر يكون بيده فحم مدقوق
متواصل رشه على القبة كلما قلب [1] عليها السباك
الفضة يمنعها ذلك من الالتصاق بعضها ببعض
وتعين على صحة تدويرها. ثم تؤخذ [2] تلك النقط
من قعر الدن فتغسل من وسخ الفحم وتنشف
على الباب. ثم يوخذ عيارها. وبالله التوفيق

الباب الرابع عشر

فى اعتبار عيار الدراهم. يؤخذ من مجموع هذه الدراهم
بعد تخليطها وزن خمسة عشر درهما وتجعل تحت
الروباش مع رطلين رصاص. والرصاص ينسبك
قبل الفضة فى بوطة قد ثلثت مخلوط الثلث
جير والثلثين رماد. وصفة الروباش منفخ مكبوب
الراس يخرج رجعه من فمه الى اسفال فى وسط البوط

1) ms. اقلب 2) ms. يؤخذ

فيخرج الرصاص ما فى جسم الفضة من النحاس.
ويصير النحاس قرصا فى وسطه قرص لطيف
الفضة[1] وفى جسم تلك الفضة من الرصاص ما
قد علق ما بقى فيها من النحاس. فتبطل النفخ
وترمى القرص الرصاص وقد عاد جنبارا. ويؤخذ
القرص الفضة ويجعل فى بوطة ثانية[2] من مخلوط
حديد[3] وينفخ عليها بالروباش كالاول الى ان يحترق
بقية الرصاص الذى فى جسم الفضة. ويصير ذلك القرص
فى وسط الرصاص اصغر[4] من القرص الاول فتأخذه وترمى
بالرصاص ايضا وتجعله فى بوطة ثالثة كما فعلت اولا.
وقد خلصت الفضة من جميع ما فيها من الرصاص
والنحاس. فحينئذ تحقق وزنها وتحرره فان كان اربعة
دراهم ونصف او ارجح فتعلم أن العيار صحيح لم
يقع فيه سهو ولا غلط ولا خيانة. فعند تسلمها الضرابون

1) ms. قرص لطيف فضة 2) ms. بوط ثانية 3) ms. جديد ؟ 4) ms. اصغر

ويجمعونها ويجلونها ويختمونها .

الباب الخامس عشر

في جلاها ليختم عليها . يؤخذ الخل الحاذق ويغلى في دست نحاس وتحمى الدراهم وترمى في ذلك الخل . وتعرك فيه بالملح الى ان يخرج سوادها ويظهر بياضها فتغسل[1] بالماء الحلو دفوعا الى ان ينقى بياضها في دستارى خشب . ثم تعرك[2] فيها[3] بالسماق الى ان يزداد بياضها وترجع كالفضة الطلغم . فتنشف بالنخالة حتى تجف وتغربل من النخالة ويختم عليها بالسكة والسلام .

الباب السادس عشر

في استخراج ما تخلف في الاكوار والبواتق والتراب[4] الفضة الورق وما يحتاج ذلك من الزيبق . توخذ[5] البوتق التى سبك فيها الورق وتسحق . وتضاف الى التراب في الحجر على كل وبيتين تراب بعد تنديتهم بالماء ستة ارطال زيبق . وتدور الحجر على ذلك نصف نهار . ثم تملا ذلك الحجر بالماء ويحرك التراب وينخ الحجر فيخرج الماء

1) ms. فتغسل 2) ms. يعرك 3) ms. فيه 4) من ؟ 5) ms. يوخذ

والتراب فى دفعة وحدة ويبقى الزيبق والفضة فتعصر
من رق فيخرج الزيبق ويبقى المتاع كالجوزة فما
اجتمع من الجوز فيجعل فى كوز فخار الى ثلثيه
ويملا بقيته بالشقاف المكسر . وركبه على قدر
فخار مملوء ماء فى جوره وتوقد على ظهر الكور
النار . فان الزيبق اذا حمى يقطر فى القدر
المملوء بالماء وتبقى الفضة الورق فتصفى[1] بالروباش
ليحرق ما فى جسمها من النحاس وتصير[2] طلغما.
وهذا العمل له اخلاف ولا يرد الى حبر المسبك
كرات الذهب والفضة النقرة .

الباب السابع عشر

فيما يلزم كل واحد من المستخدمين[3] . الذى يلزم
المشارف حفظ جميع الحواصل من فضة وذهب
وسكك وعدد وغيرها والات وصنج العيار وختم
الاقداح وختم الاتون وتحرير وزن عيارى الذهب والفضة

1) ms. يصفى 2) ms. يصير 3) ms. المستخلصين

والمقابلة بالحساب وخطه بذلك. والذى يلزم الشاهد
ان يشهد على جميع من حوت الدار بما عاينة من
اعمالهم ومباشرته اياهم ومقابلته على الحساب وخطه
بذلك عليه. والذى يلزم النقاش ان لم يكن امينا
ان يختم على يده كجارى العادة. ومن لوازمه ان
لا يشتغل بشئ سوئ نقش السكة ليتمهر
فيها لكثرة ادمانه فلا تحكيه الزغليون. وفيه فائدة[1]
اخرى ان الصناع لا يجتمعون[2] على سكة جديدة.
والذى يلزم المقدم دون الجماعة. حفظ عيارى
الذهب والفضة من ثلاثة اوجه. اولها تخفيف
معرفة وزن اصل كل هرجة ترد الى دار الضرب
ومبلغ ما استقر عليها عند الجواز ليامن تبديل
الهرجة اذا قاربت الجواز بما هو دونها فى العيار
ومع الجائزة غير مختومة من غير علم المستخدمين
ويضيع على الديوان واجبها ووقيدها. او ربما يكون عند

1) ms. عائدة 2) ms. لا يجتمعوا 3) ms. تصنع

صاحب الهرجة سكة فيختمها جارج الدار. ويكون
كلما عمل هو فى دار الضرب هرجة بواجب الديوان
قد عمل فى بيته اضعافها بلا واجب اذ له
الاختيار فى ذلك. اذ لم تجد من يعرف طريق
من يعرف حراسة الاتون اى التنور. او يجعل
فى الاتون عوضا من الذهب الاسلامى ذهب
روميا مسروقا من الخمس ولا يعلم المستخدمون
به فيضيع على الديوان واجب الخمس. وسببه
اهمال معرفة ما فى الاتون. الثانى ان الاتون اذا
كان مهملا يطرح المقدم ختمه والبوطة[1] اى
يحتوى عليه كانت اليه ابواب الفساد مفتوحة
من وجوه شتى. اولها ان الهرجة اذا قاربت الجواز
كان فى ممكن ان يعمل صاحبها فى بيته عيار
اصل وفرع من ذهب وغيره و فرع من ذهب
واحد. وعملها بعلامات مشبهة بعلامات المستخدمين
فى الاصل والفرع. وختم القدح بختم يشبه ختم الدار.

[1] ms. المرطه

واودعه الاتون سرا. فاذا عمل المستخدمون[1] عيارا
لتلك الهرجة التى[2] مقصود صاحبها سرقتها
واودعوه الاتون فلا يخرج الا القدح التم. فاذا اعتبروا
وزنه وجدوه جايزا فيؤمر بختم الهرجة وهى ناقصة
العيار على غير علم منهم. او يسرق قدحه العيار
من الاتون ويفتح وينقص من اوراق الاصل مقدار
نقص الفرع. ثم يعاد ويختم[4] كما كان. ويودع الاتون.
فاذا اعتبر وحرر عند خروجه وافق الاصل[3] الفرع.
فيظن المستخدمون ان الهرجة قد جارت فتختم[4]
وهى ناقصة العيار. او يبدل اوراق الاصل والفرع
باوراق قد هيئت[5] وهى اصل فيوافق فى التحرير
الاصل والفرع. ويؤخذ من الفضة الذهبية السحالة
الرقيقة فيجعل منها وزن قيراط فى قطعة من طين
البواتق ويلطخ ذلك الطين فى جوف بوتقة صغيرة
تكون هذه البوتقة مهياة لوقت[6] العيار الآمرى[7]

1) ms. المستخرمين 2) ms. الذى 3) الاصل؟ 4) ms. يختم
5) ms. هيات 6) ms. كوقت 7) ms. الاميرى

الذى هو الاصل. فاذا سبك فيها فقد اخلط بالسبك
هذا القيراط الفضة مع الذهب فينقص عياره.
فاذا اعتبر يكون الفرع اعلى[1] من الذهب الاصل
فيظن جواز الهرجة ليست بجائزة. واما حفظ عيار
الفضة فمن ثلاث ابواب الباب الاول ان لايصفى
حجر الفضة الا فى الدار بحضور العدول ومباشرة
المقدم وتقص حجر الفضة وطيه على الحار فان تقرد
ذلك الحجر فيعاد الى التصفية. الثانى ان لا يتولى وزن
الفضة والنحاس وايداعها الكور سواه وملازمته
الكور الى حين يفرغ السبك ومنع من يتقرب
الى الكور غير السباك خشية من تتميم او اضافة
نحاس زايد على التعديل. الثالث وهو الباب الكبير
وهو الخلل بمعرفة وجوه حفظ العيار وذلك لانه
ربما قد وقع التفريط فى تعديل الفضة والنحاس او
سهو او التتميم وقت السبك فلا يظهر ذلك
الوقت اعتبار العيار. والذى تجب الاحتراز عنه وقت

1) ms. اعلا

وقت التعديل اعنى وقت عمل العيار وهو مظنة
التتميم من تسعة وجوه. اما فى المخلوط بيان الطوب
اعنى الجير والرماد او فى الطوب الذى حول البوطة
او فى الروباش او فى الماسكة الحديد الذى
تعدل به الوسخ ويبقى الفحم على وجه المسبوك
او ترمى[1] قطعة فضة فى البوطة على حين. والذى
يلزم الضراب ان يحمى الفضة حموين اولها اجف
من الثانى وتطريق الثانية اكثر من الاولى لتسلم[2]
الفضة وقت الخلاص من السواد والحمرة. وان لا
يطفى[3] الفضة الا بالملح والخل والسماق ليظهر
كل بياضها. وان لا يختم على سكة دارسة[4].
ومهما نقص من وزن الفضة وقت العمل الزمه
ان يقوم به من اجرته. والذى يلزم السباك ان
يحصر وزن النحاس قبل طرحه فى البوتقة والفضة فى حال
السبك. فان درك ما يكون من ذلك عليه ومتى
اختل العيار كان هو المأخوذ به. فان درك الحاصل فى الحالة

1) ms. يرمى 2) ms. ليسلم 3) ms. يطف 4) ms. دراسد

السبك عليه والمسلم تحت يده. تم الكتاب بعون الله تعالى وحسن توفيقه حرر ذلك فى ثانى عشر ذى القعدة [1] المباركة سنة الف ومائة خمسة وثلاثين من الهجرة النبوية على صاحبها افضل الصلاة والسلام.

1) ms. فى ثانى عشر القعدة 2) ms. المبارك