

The print room also houses a four figure number of illustrated books, including sumptuous scientific works like the *Recueil de plusieurs traités de mathématique de l'Académie Royale des Sciences* of 1676/7, and the similar deluxe volume by M. Dodart, *Mémoires pour Servir à l'Histoire des Plantes* (1676, Paris, Imprimerie Royale). Both feature folio size frontispieces by Sébastien LeClerc showing Louis XIV on a visit to the Académie des Sciences, an image which must have offered Augustus the Strong, King of Poland since 1709, ample room for identification. In addition to books on geometry and botany, we find roughly a dozen zoological and anatomical works; among these, Frederick Ruysch's *Icon Durae Matris in concava superficie visae* (. . .) of 1738 with Jan L'Admiral's iridescent colour etching of the brain of a stillborn child, claims pride of place. The Saxon State and University Library (SLUB) at Dresden, which is one of Germany's five largest libraries and occupies a brand new building with a sky lit underground reading room designed by the prominent Austrian architect Manfred Ortner, holds additional material. However, back to the print room.

While the sketchbooks are listed in an instructive handwritten inventory of 1988 and there is a digital catalogue of printed books, it proves harder to get an idea of individual prints and drawings relating to science (Fig. 3). An internal database can currently be searched by artist's name, but so far only German drawings up to 1800 have subject captions (thematic entries for all drawings dating from before the nineteenth century will be available from around the end of 2005). Visiting scholars surprised by this cataloguing situation might bear in mind that five decades of underuse, lack of materials and limited access to the international literature and community of colleagues have left a monumental backlog of work which calls for more staff than present funding allows for, especially since other tasks – mounting fundraising exhibitions, dealing with urgent conservation issues, the recent move – have been much more pressing since 1989. A promising arena for prospective benefactors, the print room in its new premises is on the way to coming into its own again as a place of scholarship and aesthetic delight.

NOTES

1. For an excellent recent exhibition catalogue presenting a hundred and fifty highlights of the collection, see W. Holler and C. Schnitzer: *Weltsichten. Meisterwerke der Zeichnung, Graphik und Photographie*, 2004, Munich/Berlin, Deutscher Kunstverlag. Visitors planning to use the study room are asked to make an appointment beforehand, signalling what materials they wish to see (email kk@skd.smwk.sachsen.de, tel./fax +49 351 49 14 221/2). The print room's address is Staatliche Kunstsammlungen Dresden, Kupferstich-Kabinett, Residenzschloss, Taschenberg 2, D-01067 Dresden, Germany. The Keeper, Dr Wolfgang Holler, can be contacted on +49 351 49 14 210.
2. See C. H. Eilenburg: *Description du Cabinet Royal de Dresde Touchant l'Histoire Naturelle*, 1755, Dresden/Leipzig, George Conrad Walther.
3. C. Ferrão and J. Monteiro Soares (ed.): *Brasil holandês*, vol. II: *O 'Thierbuch' e a 'autobiografia' de Zacharias Wagener*, 1997, Rio de Janeiro, Editora Index; S. Pfaff: *Zacharias Wagener 1614–1668*, PhD thesis, University of Bamberg, 1997 (self-published 2001).
4. H. Bräutigam and A. Eggebrecht: *Schätze Chinas aus Museen der DDR*, 276 ff., 338 ff.; 1990, Mainz, Philipp von Zabern (exhibition catalogue, Roemer and Pelizaeus-Museum Hildesheim).

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The bird illustrations in a thirteenth century Arab natural history

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The thirteenth century Persian scholar Zakariyya al-Qazwini compiled a monumental encyclopaedia on natural history. The Munich manuscript, a copy of the encyclopaedia executed during the author's lifetime, is adorned with numerous coloured illustrations. Up to now a few of these have been analysed along stylistic lines, i.e. from a purely art historical point of view. Our aim instead is to understand the significance of the illustrations within the context of this particular manuscript. In this article we focus on the bird illustrations, taking a combined historical, ornithological and art historical approach. We first describe the general characteristics and technique of the miniatures, and then examine a selection in detail from an ornithologist's point of view. Finally, we explore possible sources and pictorial traditions that could have influenced the illustrator. We conclude that the illustrations are a pictorial counterpart to Qazwini's text, fitting the requirements of an encyclopaedia, which presents authoritative, up to date, scientific information in a well organised, concise and readily understandable form.

Among the treasures of the Arabic collection of the Bavarian State Library in Munich is a richly illustrated manuscript entitled *Adja'ib al-makhlūqat wa-ghara'ib al-mawjudat* ('The wonders of creation and the peculiarities of beings'), written by the Persian scholar Zakariyya Ibn Muhammad Ibn Mahmud al-Qazwini. According to the colophon, this copy of the book was executed by Muhammad Ibn 'Ali al-Dimashqi al-Mutatabbib in the town of Wasit, located south of Baghdad on the banks of the Tigris, and was completed on 27 February in the year 1280.¹ The epithets attached to the copyist's name indicate that he was from Damascus and had training as a physician. We do not know if he carried out the illustrations himself or if these were entrusted to a specialist.² The author of the book, Qazwini, was his teacher.³

The *'Adja'ib al-makhlūqat* is an encyclopaedic compendium of natural history, which attempts a systematic description of the whole of creation.⁴ Formally the work is not unlike a modern encyclopaedia: the text consists of short articles or entries, each of which is accompanied by an illustration. The first part of the book is devoted to the supralunar universe, i.e. the planets, the constellations and heavenly beings. The second and major part is organised according to a scheme based on the Greek notion of the four elements – air, fire, water and earth. It discusses meteorological phenomena, describes the oceans and the islands in them, and treats the three realms of nature – animal, vegetable and mineral. The latter three sections are, in turn, systematically organised. The chapter on animals, for instance, begins with a discourse on man, the parts of the human body and the different

character traits. Successive articles are devoted to beasts of burden, grazing animals, carnivores, birds, insects and 'creatures of prodigious form'.

Zakariyya al-Qazwini was born in 1202 in the town of Qazwin, northwest of Tehran. He was the son of a respected family known for its lawyers. It was therefore not surprising that he took up the study of law. Qazwini spent some time in Mosul in northern Iraq, where he pursued his studies. In Mosul the local ruler was a patron of rational philosophy and cultivated dialogue between the four schools of Sunni legal thought, the Shia and the Christians. It was in this enlightened atmosphere that Qazwini studied philosophy and natural history under the guidance of his teacher al-Abhari. Here, too, he met Yaqut al-Hamawi and witnessed the writing of his book on geography. This period of Qazwini's life undoubtedly shaped his intellectual interests and laid the foundations for his two monumental works – his encyclopaedia on natural history and a book on geography. Both books were written in Wasit after Qazwini had been appointed judge by the last Abassid caliph. This was a period of political turmoil following the conquest and destruction of Baghdad by the Mongols under Hülägü in 1258. The Persian ruler charged with governing the province after the execution of the caliph was a patron of the arts and letters. Under his aegis Qazwini carried on his official duties and pursued his research until his death in 1283 at the age of eighty-one.

The general framework of the *'Adja'ib al-makhlūqat* is based on the Aristotelian world picture, as it was handed down in the great Arabic encyclopaedias of the tenth and eleventh centuries. Qazwini adheres to the traditional outline, but draws on specialised literature as sources for the various chapters. In his chapter on animals the author discusses one animal after another in series. Each entry begins with a summary of an animal's characteristic traits and behaviour, followed by notes on the medicinal uses of its body parts. The chief source of general faunistic information is the tenth century *Book of Animals* by al-Djahiz. For medical knowledge Qazwini relied on Avicenna's *Canon of Medicine*, an eleventh century work, and most probably on a lost book by Balinas. These two authors were recognised medical authorities in Qazwini's day.

The origin of the illustrations in the Munich manuscript is a different problem altogether. We cannot be sure whether the Munich manuscript was the very first illustrated version of Qazwini's text, although it was produced in close proximity to the author while he was still alive. At some point during that period an 'original' set of miniatures must have been composed. It is likely that these master illustrations drew on pictorial sources such as specialised treatises on medicine and natural history. It is difficult to trace these sources, because the enormous manuscript production up to the thirteenth century is for the most part lost. Studies on the pictures of the planets and constellations in the Munich manuscript indicate that they are derived from similar pictures in one of the very few early illustrated scientific works to have survived.⁵ This question will be discussed below in more detail. Unfortunately, most of the art historical studies that deal with the illustrations have been devoted to stylistic analyses and have focused on miniatures portraying human beings.⁶

Of the 174 real and mythical animals described in the faunistic part of Qazwini's book, fifty-seven are birds. Thus, the avifauna play an important role in the author's zoography.⁷ The finely executed miniatures which accompany the written account of each bird in the Munich manuscript attract the attention of scholar and layman alike. In the following we focus our attention on the bird illustrations. We first describe the general characteristics and technique of the miniatures and then examine a selection in detail from an ornithologist's point of view. Finally, we explore possible sources and pictorial traditions

that could have influenced the illustrator. The ultimate goal of the study is to understand the role of the illustrations within the context of the earliest surviving copy of Qazwini's encyclopaedia.

The copy of Qazwini's encyclopaedia which is now in Munich was completed three years before his death. The extant manuscript consists of 213 leaves, the edges of which have been cropped. The text block, written in clear *naskh* script, measures 268 by 168 millimetres, with twenty-seven lines to the page. The frame ruling consists of a fine, double red line, which is also used to set off the headings and the illustrations. The 467 coloured illustrations and forty-four drawings combine to make it a magnificent example of the illustrator's art.⁸

In the Munich manuscript the chapter on birds begins with a title line on page 185v: 'The fifth kind of animals: the birds'. There follow twenty-three pages encompassing fifty-three miniatures. One leaf of the original manuscript (fol. 189), including four illustrations, is missing. The missing text has been replaced by a passage written in a later hand, however it lacks illustrations.⁹ The extant illustrations are distributed throughout the chapter with one to five pictures per page. The *mise en page* is by no means haphazard, but rather the result of careful planning (Fig. 1). Each picture is positioned just below or next to the



1 From top to bottom: dove (shifnin), bee eater (shiqirra), unidentified songbird (safir), Saker falcon (saqr), unidentified seabird (ta'ir al-bahr) (Munich, Cod. arab. 464, fol. 191v)



2 a from top to bottom: peafowl (ta'wus), partridge (tahudji), sparrows ('usfur) (Munich, Cod. arab. 464, fol. 192r); b peafowl on an Andalusian silk, twelfth century; c owl (bum) (Munich, Cod. arab. 464, fol. 187v)

lemma naming the bird it depicts. Never does it precede the corresponding text. The panels are always flush with the frame ruling, so that they border on the text on two or three sides. The panels vary in size, but most of them are between four and six lines in height and approximately half a page in width. The illustrator uses the panels as an indicator of scale. Large birds occupy the entire width and height of the panel. Correspondingly, small birds are rendered in minute drawings leaving most of the panel empty. Compare, for example, the difference between the peafowl, the partridge and the sparrows (Fig. 2a). In only a few cases do illustrations exceed these dimensions. A conspicuous example is the picture of the legendary 'Anqa' bird. Here the artist seems to use the oversized panel to emphasise the extraordinary or prodigious character of the bird (Fig. 3, bottom).

The miniatures consist of finelined sketches which render both the silhouette of the bird and some anatomical details such as wings, feathers, etc. Painting was done with opaque colours. Various shades of red, blue, green, black, white, grey and brown are used. Almost all of the birds are drawn in profile, and they occupy the empty picture fields with no background. In most cases the birds 'stand' on the ruling at the bottom margin of the panel. Five birds are shown in flight (for example Fig. 1, bottom right), and one in the water (Fig. 9b). Only three miniatures include elements indicative of landscape or natural habitat: the parrot is standing on a small mound, the dipper is swimming (Fig. 9b), and an unidentified songbird is hanging upside down from a branch (Fig. 1, middle right). None of the birds are portrayed with accessory figures.¹⁰ Only one or two pictures include a narrative component. Examples are the dipper with a fish in its mouth (Fig. 9b), and the



3 Top: magpie ('aq'aj), bottom: 'anqa' (Munich, Cod. arab. 464, fol. 193r)

stork that has caught a snake (Fig. 8b). The illustrator of the Munich manuscript excludes superfluous features from the miniatures and concentrates on depicting the animal itself. This terse and static mode of representation is consistent with the function of the miniatures as illustrations of a scientific work on natural history, and is a feature the Munich manuscript shares with modern books on ornithology. The illustrations are complementary to the written content, providing information absent from the text on the appearance of the birds.

If we approach the illustrations from the point of view of a field ornithologist, attempting to identify each bird solely on the basis of the pictorial information, we will have limited success. In only a few cases is it possible to determine the species of the bird depicted. In most cases the drawings do not provide nearly enough detail to permit identification. At best we can narrow the field down to a family or order. A few pictures portray winged creatures which do not even remotely resemble known species. The suspicion that these are mythical or fabulous creatures is, at least in one case, confirmed by the written account (Fig. 3, bottom). The few illustrations that permit identification at the species level are no more accurate than the others. Rather, they portray birds with such unique and extraordinary features that they are unmistakable.

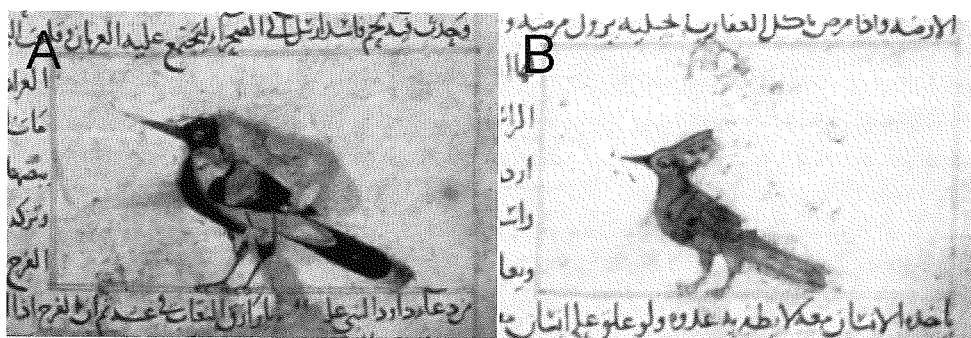
The upper panel of fol. 193r shows a medium sized black and white bird with a long, rounded or graduated tail and a long, slightly decurved bill (Fig. 3, top). The head, breast and tail feathers are black, as is part of the wing roughly corresponding to the primary and secondary feathers. A black bar marks the leading edge of the wing. The anatomical features and colouring of this bird do not match any of the Middle Eastern species.¹¹ The

black and white plumage and long tail are, at best, reminiscent of a shrike. However, the trinket held by the bird in its bill makes it clear that the illustrator had another black and white bird in mind – the common magpie (*Pica pica*). This identification is confirmed by the corresponding passage of the text, in which Qazwini writes: ‘This is a well known bird. It is deceptive by nature. It steals precious objects such as jewellery and gems and leaves them somewhere.’¹² Thus, it is a narrative element in the illustration that leads to a positive identification.

The drawing of the magpie is an example of the few illustrations which can with certainty be assigned to a particular species. It is an instructive case, because it tells us what we can and cannot expect from the illustrations in terms of accuracy. In shape and posture the bird in the miniature is a fairly good rendering of the magpie. However, the magpie’s beak is in reality shorter and broader; the tail is much more slender. Other typical features have been neglected by the illustrator. Most conspicuously, the pattern of black and white markings is not even remotely correct. It seems that the illustrator is committed to portraying the animal in a rather superficial fashion and with a minimum of detail. In this regard the magpie miniature is representative of the bird illustrations in general.

A second miniature depicts a bird similar in size and shape to the magpie and with an almost identical pattern of black and white markings (Fig. 4a). This poses a riddle, because the magpie is unique in form and markings. Qazwini tells us that this is the *ghurab*, a word which can mean either raven or crow. The same is true of the Persian name, *kilagh*, also given by Qazwini.¹³ The bird in the miniature bears no resemblance at all to the common raven (*Corvus corax*), an entirely black bird with a short, wedge shaped tail, large head and massive beak. Perhaps the illustrator had the hooded crow (*Corvus cornix*) in mind. The accompanying text seems to be referring to the raven, since it recounts the common but erroneous belief that the raven neglects its young.¹⁴ Linguistic ambiguities, which persist in modern Arabic and are compounded by regional differences, are probably the basis of this discrepancy between text and illustration.

Four miniatures depict representatives of the Falconidae, which is not surprising since the Arabs were keen falconers early on. The picture on fol. 191v portrays a bird with jesses attached to its legs, indicating that it has been trained for the hunt (Fig. 1, bottom left). The illustration shows the typical head and beak of a falcon, but is otherwise too ambiguous for a species to be assigned. Qazwini gives the name of the bird as *saqr*. He is probably referring to the Saker falcon, *Falco cherrug*, a species popular among hunters.



4 a raven/hooded crow (*ghurab*) (Munich, Cod. arab. 464, fol. 193v); b hoopoe (*hudhud*) (Munich, Cod. arab. 464, fol. 196v)

The miniature in Fig. 4b shows a bird with a crest of long, thin feathers on its head. The bill is of medium length. It is straight and tapers to a sharp point. The plumage is a uniform, dull shade of ochre. On the wing a zone of scapulars and a single row of coverts are indicated. The tail is of medium length and rounded. Aside from the row of feathers on the crown (drawing partly obliterated) and the long bill, the bird is rendered without characteristic features. Nevertheless, it is immediately recognisable as a hoopoe (*Upupa epops*), a common species resident in presentday Iran and the western part of the Arabian peninsula. A closer examination of the image reveals that the illustrator has not attempted to give an accurate picture of the bird. The same ochre tone is used for the plumage on the head, throat, wings and back. Neither the striking pattern of black and white stripes on the wings and rump nor the transverse white bars on the black tail are shown.

Qazwini’s remarks on the hoopoe are a colourful mixture of fact, anecdote and myth. Here as elsewhere medicinal uses of the bird are discussed at length.¹⁵ An interesting passage refers to the hoopoe’s nesting behaviour: ‘It is said that the hoopoe besmirches its nest with human faeces causing its stench. In the spring one can see flies coming out of the hoopoe’s mouth. Where the hoopoe lives there are no woodworms.’¹⁶ The reference to the vile smell of the nest is correct, but the explanation involving human faeces is false. In brooding females and the young a special organ called the uropygial gland is hypertrophied. In this state the gland secretes copious amounts of a vile smelling fluid. The secretion is an effective chemical repellent used to ward off predators. If the nest is molested the bird sprays this fluid at the attacker. Even when undisturbed the smell of the nest is overpowering.¹⁷

One of the least spectacular birds of the series is shown here in Fig. 7a. The plumage is a uniform, dull brown without markings. The tail is short, the beak short and thin. The bird has one characteristic feature: a prominent topknot. Only a few Middle Eastern species have topknots like this. These include the bulbuls, the waxwing and the crested lark. Whereas the bulbuls and waxwing have distinctive, brightly coloured markings, the latter is a drab bird. The bird in the miniature is very probably the crested lark (*Galerida cristata*), a species common throughout the Middle East. The crested lark breeds near human habitation, and is therefore a common sight for farmers and townspeople alike.

In a quaint picture of an owl (Fig. 2c) we see a large, stocky grey bird with a black tail. The large head, close set, frontally oriented eyes and masklike facial plumage are typical features. Other distinctive traits and markings are absent, so it is not possible to associate the drawing with a particular species. The grey plumage and the V shaped design on the face are reminiscent of a Scops owl (*Otus* sp.), three species of which are resident or common migrants in the Middle East. In this drawing as in the others a general neglect of detail is apparent. However, the illustrator employs an interesting trick to make the image more ‘realistic’. The wing is shown with rows of feathers differing in size and shape. Indeed, this is based on the observation of the variety of feathers in birds’ wings. However, the pattern of feathers does not reflect the individual morphology of the species shown, but is rather a formula used over and over.

Another impressive miniature depicts the Indian or blue peafowl (*Pavo cristatus*) (Fig. 2a, top). It is not at all lifelike but is, nevertheless, immediately recognisable, owing of course to the unique train for which the peafowl is famous.¹⁸ Qazwini enthusiastically describes the ocelli of the tail feathers: ‘In the middle of each feather is a ring of gold set against a background of blue and green in various hues that are in harmony with one another such

that the combination is the epitome of beauty and embellishment.' He also knows that the peafowl undergoes an annual moult: 'Every fall it sheds its feathers and when the trees bedeck themselves with new leaves, so too does the peafowl clothe itself again with feathers.'¹⁹ It is not unlikely that Qazwini had firsthand knowledge of a peafowl, since the bird breeds in captivity and is also feral in many parts of the world. The illustration is remarkable because it combines two different modes of representation. The head, neck and rump are rendered in the style of the other drawings. The illustrator has captured typical features of the bird including the long, curved neck, the long, flat body and horizontal posture. As elsewhere, he has taken no pains to record the colouring or texture of the plumage. In contrast to the anterior part of the body, the rendering of the tail feathers is highly stylised and ornamental. The ocelli are symbolised by a tapering series of golden circles forming an arc, which ends in an ornamental flourish.

The peacock is an important ornamental motif in Islamic art. It is the bird of paradise and a symbol of the sun. In courtly paintings it represents the noble garden, plenty, water or springtime, but it is also used in sepulchral art to represent the afterlife in paradise.²⁰ Peacocks are often employed in heraldic emblems. A good example of this is the design on silk in Fig. 2*b*.²¹ Here a pair of birds is shown in profile in a stylised symmetrical ornament. The erect tail feathers form an arc, which ends in a curve as in the Munich illustration (Fig. 2*a*, top). The schematically rendered ocelli are a typical feature.²² It seems that our illustrator is torn between two forms of visual representation: a 'realistic' or 'naturalistic' approach and the use of traditional ornamental formulae. The miniature appears to be a compromise between them. Interestingly, this is the only one of the bird illustrations to incorporate such an ornamental device, even though other birds, such as the eagle and the falcon, are common decorative and symbolic motifs in Islamic art and craft.²³ None of the raptors depicted in the Munich manuscript is rendered in an ornamental or schematic way.

Summarising our observations on the bird illustrations – of which those discussed above are a small but representative selection – some general characteristics and tendencies can be noted:

- the birds are – with only one or two exceptions – portrayed singly and in profile
- the representation is static; decorative and narrative components such as landscape, vegetation and accessory figures are absent
- care is taken to portray shape and stance correctly
- the illustrator does not attempt to render anatomical details faithfully. There is no indication that drawing was guided by systematic observation, not even for birds that were readily available for closeup examination
- coloured markings are generally neglected; this is not merely a consequence of limitations imposed by availability of pigments
- differentiated portrayal of some details, e.g. the morphology of wing feathers, is attempted. It is, however, carried out in a stereotypical fashion
- birds are drawn 'to scale'; roughly uniform pictorial fields are used as an indicator of size.

The above discussion points out various features of the bird illustrations that are compatible with the notion that they were conceived as scientific illustrations and seen as such by the reader. However, the evidence considered above is alone not sufficient to support that conclusion. Without detailed comparative studies encompassing animal representations preceding and contemporary with the Munich manuscript, attempts at interpretation will be operating in a vacuum. A comprehensive study along these lines would go far beyond

the scope of this article. We limit ourselves here to an appraisal of a few key sources. The confrontation with this material, however limited it may be, provides a stylistic basis for understanding the significance of our bird illustrations.

It is generally accepted that the beginnings of Islamic illumination lie in illustrated books of natural history and medicine, the majority of which have been lost.²⁴ The surviving manuscripts of a book on astronomy written by al-Sufi and the extant copies of various Arabic translations of Dioscurides' *De Materia Medica* are our main sources of information on Arabic scientific illustration. The chapter on the planets in Qazwini's encyclopaedia is actually an abridged version of al-Sufi's book.²⁵ The latter is a specialised treatise that, unlike Qazwini's book, deals with astronomy only. Bothmer has clarified the relationship between the illustrations of the earliest surviving manuscript of al-Sufi's work – dating from the early eleventh century – with the planet miniatures in the Munich manuscript. The latter draw on the same iconographic tradition as that preserved in the eleventh century manuscript but are simplified versions.²⁶ The important point here is that the astronomical illustrations in the Munich manuscript are based on the artwork of a scientific astronomy book and not on the pictorial traditions of magical and astrological writings.²⁷

Were there comparable illustrated handbooks on birds that the artist of the Munich manuscript could have used as a model for his illustrations? As mentioned above, the *Zoology* of al-Djahiz and Avicenna's famous book on medicine are the two main sources for Qazwini's chapter on animals. It is unlikely that either book was originally conceived as an illustrated work. There is, however, an illuminated copy of al-Djahiz' book that has been dated to the fourteenth century.²⁸ The pictures in that manuscript are narrative in character, portraying the typical traits and behaviour of animals described by the author in the text. A picture of an ostrich, for instance, shows the bird sitting on a nest full of eggs. The nest is on a small hill in a hollow surrounded by vegetation (Fig. 5*b*).²⁹ In the corresponding text al-Djahiz writes: 'The Bedouins have a saying: "more stupid than an ostrich". This is because it ceases to brood on its eggs when longing for food, meanwhile if it sees eggs belonging to another ostrich, which has gone away in search of food, it broods on these eggs and forgets its own.'³⁰ Qazwini quotes this passage of al-Djahiz' book, albeit in abridged form.³¹ However, the ostrich illustration in the Munich manuscript is not remotely like that described above. On the contrary, the picture shows the bird in profile standing upright and is devoid of details referring to landscape or nesting behaviour (Fig. 5*a*). The fundamental difference between the two illustrations leads us to conclude that the artist of the Munich manuscript did not draw on a copy of al-Djahiz' book with illustrations like the one described above.

Among the surviving Arabic scientific manuscripts of the Middle Ages are several copies of the *De Materia Medica* of Dioscurides; the oldest of these originated in the late eleventh century.³² This book deals predominantly with medicinal herbs, but also mentions some animals and, among them, a few birds. The parallels between the bird illustrations of the eleventh century herbal and those of the Munich manuscript are unmistakable. The former are simple but lifelike. Each bird is shown in profile and without any background. The picture of the crested lark is a good example (Fig. 7*c*, middle right).³³ Another copy of the Arabic *De Materia Medica* dates from the twelfth century. Here too we find lifelike representations of the birds without scenery. It is interesting to compare the picture of a hen in this manuscript (Fig. 6*b*) with the hen in the Munich manuscript (Fig. 6*a*). The style and technique of the two miniatures is quite similar, however the former depicts a scene in which the hen is being slaughtered by a man for another who has suffered a snakebite.³⁴



5 Ostrich (na'ama): *a* Munich, Cod. arab. 464, fol. 196r; *b* Milan, Bibliotheca Ambrosiana, Ar. A.F.D. 140 Inf., fol. 10r

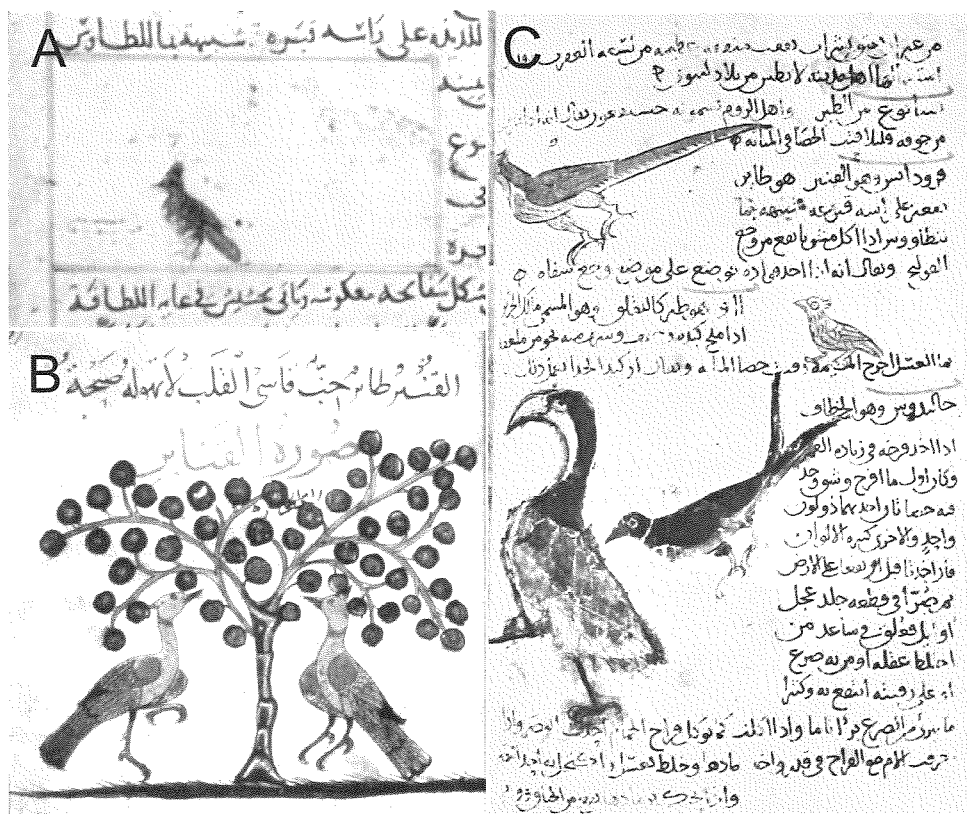
This is a pictorial summary of a passage in the text describing the use of hen's blood to make an antidote to snake venom. Some illustrations of plants also portray accessory figures.³⁵ This narrative character is absent from the miniatures in the Munich manuscript. Despite the narrative aspect, the illustrations in the Dioscurides manuscripts are characterised by their naturalistic or 'objective' style. Their prototypes could well be sources of the illustrations of our Qazwini manuscript.³⁶

Whereas the two illustrated copies of Dioscurides mention only a few of the fifty-seven bird species discussed by Qazwini, a book by the eleventh century Arab physician Ibn Bakhtishu' on the medicinal use of animals treats many different kinds of birds. An illustrated version of this text dating from the early thirteenth century is preserved in the British Library.³⁷ This manuscript, which predates Qazwini's encyclopaedia, contains thirty bird illustrations.³⁸ A comparison with the miniatures of the Munich manuscript is quite instructive. The picture of the lark (Fig. 7*b*) is representative of the illustrations of the London manuscript and is therefore a good example on which to base our discussion. The artist has painted a pair of birds in profile and facing each other. The birds are 'standing'



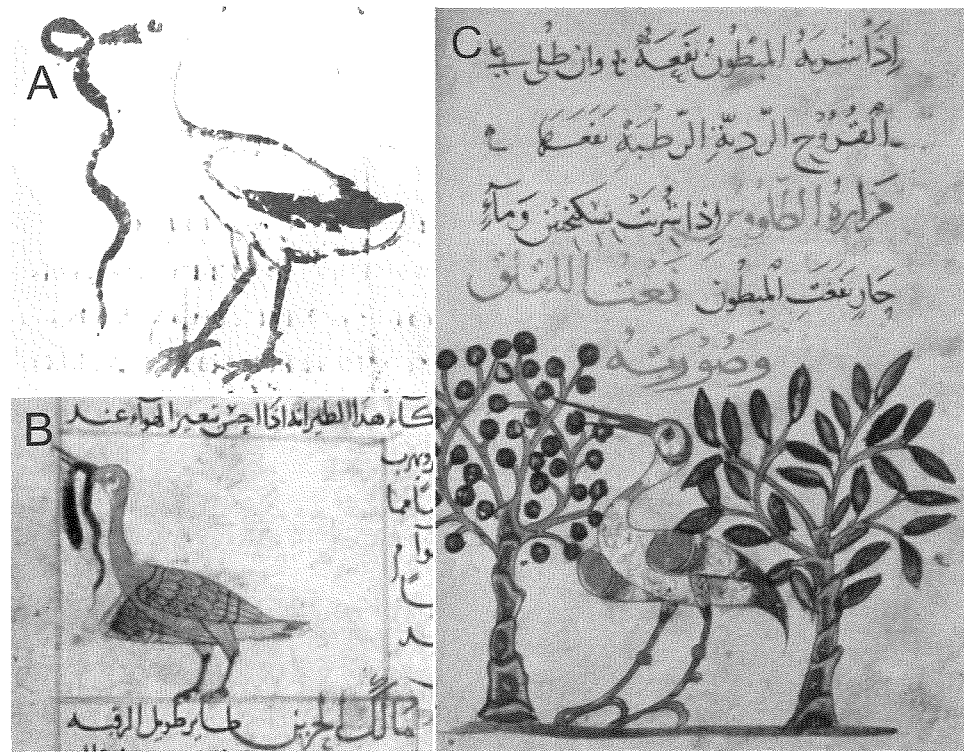
6 Hen (dadjdjad): *a* Munich, Cod. arab. 464, fol. 190r; *b* Mashhad, Museum of the Shrine of the Sacred Imam Reza

upright amidst floral scenery, and grass forms the lower margin of the picture. One bird touches the ground with its right foot, the other touches it only with its long tail feathers. Thus they are 'hovering' above the ground in an artificial and unlikelike posture. Between the birds is a tree whose branches frame their heads, adding to the highly ornamental character of the picture. The painting is finely done and details such as the single feathers and the birds' characteristic topknots are painstakingly rendered. Despite the attention to detail this and the other illustrations in the manuscript are ornamental and stylised, in marked contrast to the miniatures of the Munich manuscript (cf. Fig. 7*a*). The symmetrical composition is reminiscent of a heraldic device. An interesting feature is the stylised rendering of the leading edge of the birds' wings as a golden oval. This ornamental formula is a



7 Crested lark (qubbara): **a** Munich, Cod. arab. 464, fol. 194v; **b** London, Ms. Or. 2784, fol. 21r; **c** Leiden, University Library, Cod. Or. 289, fol. 64v

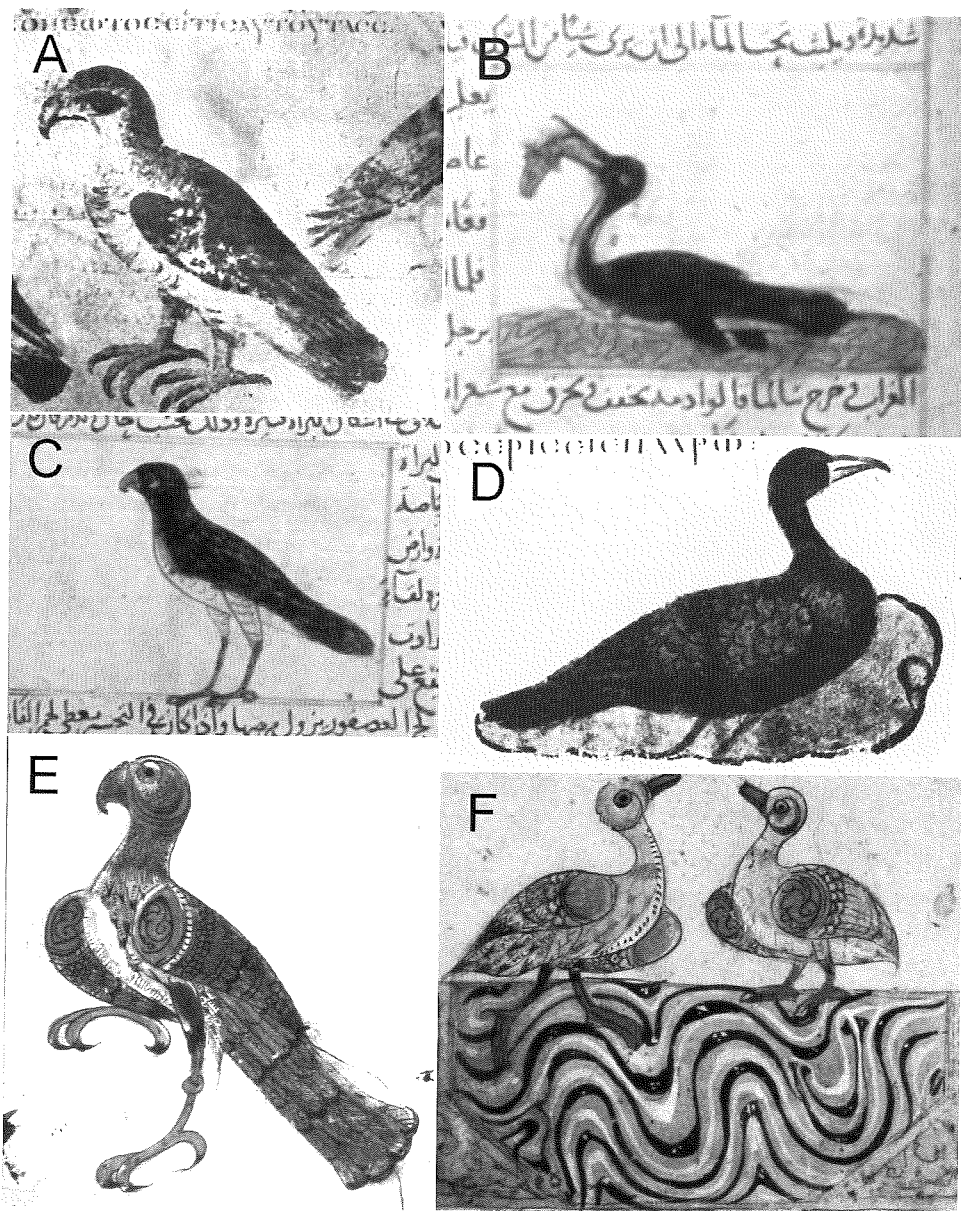
recurrent feature of the bird illustrations in this manuscript.³⁹ The picture of a stork (Fig. 8c) shows the bird in profile 'standing' on the bottom line of the panel, flanked on both sides by tall trees. The silhouette of the animal describes an elegantly curved line: the long neck arching back, the round breast and the curvature of the body carried through to and ending in the tail feathers are, together with the slightly upturned bill, elements of a harmonious composition of curves. This painting typifies the artistic goals manifest throughout the London manuscript. In contrast, the illustrator of the Munich manuscript is not guided by artistic ambitions. His painting of a stork (Fig. 8b) is a modest portrayal that shuns aesthetic effects. The sketch of the wing feathers is, in comparison to the lark's wing feathers in the London manuscript (Fig. 7b), cursory and haphazard. The silhouette of the abdomen ends abruptly at the base of the tail feathers. The latter feature contrasts sharply with the elegant, uninterrupted curves of the London stork (Fig. 8c). These observations reveal the divergent tendencies of the two sets of illustrations. On the one hand we have unmistakable artistic aspirations, which sacrifice verisimilitude for the sake of aesthetic effects, resulting in a sterile and artificial appearance. On the other, we have in the Munich miniatures a set of illustrations that are simple in technique and unambitious in composition, but which, thanks to the drawing skills of the illustrator, render the birds truer to life. This does not mean that across the board the Munich illustrations are more accurate than their counterparts in the London manuscript; the latter pay more attention to correct portrayal of colouring and markings, as can be seen in the case of the stork miniatures.



8 Stork (laqlaq): **a** Vienna, Cod. Med. Gr. 1, fol. 465r; **b** Munich, Cod. arab. 464, fol. 195v; **c** London, Ms. Or. 2784, fol. 231v

In summary, the London copy of Ibn Bakhtishu's *Zoology* depicts a large number of different bird species. The style of these paintings is, however, so far removed from that of the Munich miniatures that we can with certainty exclude a connection between them.

The roots of Arab medicine and natural history lie in Greek learning. The extensive use of Greek sources by Arab scholars is well documented. Therefore, in attempting to trace the origins of our bird illustrations, it is legitimate to look beyond the horizon of Arab scholarship. An interesting series of bird illustrations has survived in a Byzantine manuscript of the sixth century. This book, a paraphrase of the *Ornithiaca* of Dionysius, is devoted exclusively to birds. Half of the forty-eight bird miniatures are executed in gaps in the text not framed by ruling. The birds are depicted singly, usually in profile and standing upright. The rendering is static but nevertheless lifelike. Form and colour are fairly authentic, as can be seen, for instance, in the picture of a falcon (Fig. 9a).⁴⁰ The corresponding miniature in the Munich manuscript (Fig. 9c) simplifies many features, for example the shading between the lightly coloured breast and the darker back. Nevertheless, the style is comparable, as is apparent in details such as the hatching of the breast and legs. In marked contrast to these two pictures is the falcon illustration in the London manuscript (Fig. 9d). Here the minute details are clearly ornamental in character. Typical of this tendency is the rendering of the down feathers, which are painted in gold and form delicate spiral patterns. The illustrations of the Byzantine *Ornithiaca* and our manuscript share an allegiance to objectivity and parsimony of representation. Both avoid ornamental embellishment, extraneous details and narrative elaboration. When narrative features are used, they are used sparingly to characterise the behaviour or natural habitat of the animal and are surprisingly similar. Examples of this are the stork with a snake in its bill (Fig. 8a,b), and aquatic birds



9 Falcon (bazi): *a* Vienna, Cod. Med. Gr. 1, fol. 474r; *c* Munich, Cod. arab. 464, fol. 186v; *e* London, Ms. Or. 2784, fol. 29v. Waterbirds afloat: *b* dipper (ghawwas) (Munich, Cod. arab. 464, fol. 194r); *d* kingfisher (Vienna, Cod. Med. Gr. 1, fol. 489r); *f* goose and duck (London, Ms. Or. 2784, fol. 10r)

shown swimming in the water (Fig. 9*b,f*).⁴¹ The stork in the London manuscript is depicted without a snake (Fig. 8*c*), however this book does portray birds in an aquatic habitat: a goose and a duck are shown swimming in a pool of water within a rectangular basin (Fig. 9*f*). The walls of the basin and the wave pattern introduce an artificial and decorative element into the picture, which is absent from the corresponding illustration in the Munich manuscript. Here the irregular wavy lines are a mere allusion to the surface of the water on which the dipper is swimming (Fig. 9*b*). The miniature in the Byzantine bird

book is similar (Fig. 9*d*). In addition to the miniatures mentioned above, the Byzantine manuscript contains twenty-four other bird illustrations presented in a single plate divided by ruling into separate, quadratic pictorial fields. Just as in the Munich manuscript, the panels are used as an indicator of scale.⁴²

We have seen that the illustrations in the Munich manuscript strive to portray birds in an objective and lifelike way. They are artistically unpretentious and avoid decorative and narrative components.⁴³ This argues the case that they are true scientific illustrations. The results of our limited comparative investigations support this conjecture and show that the Munich bird miniatures are part of a tradition of scientific illustration employed in specialised books on medicine and natural history. There were evidently different currents within this tradition. Our illustrator modelled his work on precedents that were committed to authenticity and precision and eschewed extraneous details and ornamentality. He attempts to portray birds in a lifelike manner and to depict their form and posture correctly. On the other hand, he neglects or simplifies colour and markings as compared to bird illustrations in other Arabic manuscripts. Interestingly, the latter tendency parallels the style of the planet illustrations in the Munich manuscript (see above).

All of the abovementioned characteristics fit the requirements of Qazwini's encyclopaedia, which presents authoritative, up to date, scientific information in a well organised, concise and readily understandable form.⁴⁴ The illustrations are a pictorial counterpart to Qazwini's text, which consists of resumés of specialised writings by recognised scientific authorities of his day. Like modern encyclopaedias, Qazwini's work makes specialist knowledge available to a broader educated public. The readership may have included nobles, court officials, students and scholars seeking information in areas outside their own fields of specialisation. Clearly, the miniatures of our thirteenth century manuscript are a far cry from the illustrations of modern ornithological reference works. The latter are characterised by meticulous attention to detail and are the products of extensive observations in the field and on museum specimens. However, judging the faunistic artwork of Qazwini's encyclopaedia by modern standards alone does not do it justice. An adequate appraisal of the illustrations requires us to consider them in their original context, keeping in mind above all the conceptual constraints of thirteenth century zoography. The modern concept of species – implicit in and a prerequisite of modern biological illustration in general – is so obvious to us, that we forget it is a relatively recent development. The groundwork for this conceptual breakthrough was laid by generations of scientists who described and catalogued natural diversity. The Munich manuscript and its illustrations epitomise the pioneering work of Arab scholars in this field.

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NOTES

1. Munich, Cod. arab. 464, fol. 212v.
2. H.-C. Graf von Bothmer: *Die Illustrationen des 'Münchener Qazwini' von 1280. (cod. Monac. Arab. 464). Ein Beitrag zur Kenntnis ihres Stils*, PhD thesis, University of Munich, 1971. The author speculates (p. 16) that the artist was most probably also the writer of the text ('möglicherweise war er (der Maler) zugleich der Schreiber des Texts') and that a single artist was responsible for the whole work ('ein Maler die gesamte Ausstattung geleistet hat').

3. S. von Hees: *Enzyklopädie als Spiegel des Weltbildes. Qazwini's Wunder der Schöpfung – eine Naturkunde des 13. Jahrhunderts*, 85, 93; 2002, Wiesbaden, Harrassowitz. This work is the source of much of the background information on Qazwini and the 'Adja'ib al-makbluqat in the following paragraphs.
4. S. von Hees: 'Adja'ib al-makbluqat – an encyclopaedia on natural history?', in *Encyclopaedic Activities in the Pre-Eighteenth Century Muslim World*, (ed. G. Endress); in press, Leiden, Brill.
5. F. Saxl: 'Beiträge zu einer Geschichte der Planetendarstellungen im Orient und im Okzident', *Der Islam*, 1912, 3, 151–177; H.-C. Graf von Bothmer: *Die Illustrationen* (see Note 2).
6. R. Ettinghausen: *Arab Painting*, 1962, Cleveland, OH, Skira; H.-C. Graf von Bothmer: *Die Illustrationen* (see Note 2).
7. G. Jacob: 'Ornithologisches zu Qazwini', in *Studien in arabischen Geographien*, vol. III, part II, 95–124; 1892, Berlin.
8. See H.-C. Graf von Bothmer: *Die Illustrationen*, pp. 160–166 (Note 2).
9. For a complete list of the birds see S. von Hees: *Enzyklopädie als Spiegel des Weltbildes*, pp. 136f (Note 3).
10. See the comparative discussion of an eleventh century copy of *De Materia Medica* below.
11. In the following discussion bird identifications are based on R. F. Porter, S. Christensen and P. Schiermacker-Hansen: *Field Guide to the Birds of the Middle East*, 1996, London, T. & A. D. Poyser. Information on species distribution is taken from the above work and from S. Cramp *et al.* (ed.): *Handbook of the Birds of Europe, the Middle East and North Africa. The Birds of the Western Palearctic*, 1994, Oxford, Oxford University Press. Morphological and behavioural information is taken mainly from J. del Hoyo, A. Elliott and J. Sargatal (ed.): *Handbook of the Birds of the World*; 2001, Barcelona, Lynx Edicions. Information on raptors was taken from J. Ferguson-Lees and D. A. Christie: *Raptors of the World*; 2001, London, Helm.
12. Munich, Cod. arab. 464, fol. 193r.
13. U. Schapka: *Die persischen Vogelnamen*, PhD thesis, University of Würzburg, Germany, 1972, 174, 218.
14. Munich, Cod. arab. 464, fol. 193v.
15. On the importance of the hoopoe in home medicine cf. H. Venzlaff: *Al-Hudhud. Eine Untersuchung zur kulturgeschichtlichen Bedeutung des Wiedehopfs im Islam*, 1994, Frankfurt, Peter Lang.
16. Munich, Cod. arab. 464, fol. 196v.
17. A. Kristin: 'Family Upupidae', in J. del Hoyo, A. Elliott and J. Sargatal (ed.): *Handbook of the Birds of the World* (see Note 11).
18. We cannot exclude the possibility that this miniature depicts the green peafowl (*Pavo muticus*), a bird which is much less common in captivity.
19. Munich, Cod. arab. 464, fol. 192r.
20. A. Daneshvari: 'A preliminary study of the iconography of the peacock in medieval Islam', in *The Art of the Seljuqs in Iran and Anatolia*, (ed. R. Hillenbrand), 192–200; 1994, Costa Mesa, CA, Mazda; M. Müller-Wiener: 'Adler, Pfau und Phönix. Vogeldarstellungen in der islamischen Kunst', *Weltkunst. Aktuelle Zeitschrift für Kunst und Antiquitäten*, 1995, 65, 370–372; M. I. Hussein: *Die Vergnügungen des Hofes und Alltagsleben*, 74; 1981, Berlin, Edition Orient; F. Viré and E. Baer: 'Tawus', in *Encyclopaedia of Islam*, (ed. P. J. Bearman *et al.*), vol. 10, 396f; 2000, Leiden, Brill.
21. Cf. B. Lewis: *Welt des Islam*, 242; 2002, Munich, Orbis.
22. Cf. A. Daneshvari: 'A preliminary study', Fig. 180, Buyid silk, tenth century (see Note 20), and *Medieval Tomb Towers of Iran. An Iconographic Study*, Fig. 30, 47; 1986, Lexington, KY, Mazda.
23. A. Daneshvari: *Animal Symbolism in Warqa wa Gulshab*, 73–78; 1986, Oxford, Oxford University Press; see also M. Müller-Wiener: 'Adler, Pfau und Phönix', p. 371 and M. I. Hussein: *Die Vergnügungen*, p. 73 (Note 20).
24. E. Hoffmann: *The Emergence of Illustration in Arabic Manuscripts: Classical Legacy and Islamic Transformation*, PhD thesis, Harvard University, MA, USA, 1982.
25. P. Kunitzsch: 'The astronomer Abu l-Husayn al-Sufi and his book on the constellations', *Zeitschrift für die Geschichte der Arabisch-Islamischen Wissenschaften*, 1986, 3, 60f.
26. H.-C. Graf von Bothmer: *Die Illustrationen des 'Münchener Qazwini'*, pp. 88, 79 (see Note 2). According to Bothmer, 'Verglichen mit Marsh 144 ist Vieles vereinfacht. Es werden nicht verschiedene Arten von Sternen farblich unterschieden, sondern alle sind durch gelbe Kreise, von schwarzem Kontur umfaßt, gegeben. Es fehlt die Numerierung der Sterne, die dort die tabellarische Erfassung möglich machte' ('Compared to Marsh 144 [the copy of the al-Sufi book now in the Bodleian Library, Oxford] many are simplified. The different types of stars are not differentiated by way of colouring, but they are all shown in the same way as yellow dots with black outlines. Also missing is the numbering of the stars which [in Marsh 144] allowed tabular identification').

27. Cf. A. Caiozzo: *Images du ciel d'Orient au Moyen Âge*; 2003, Paris, Presses de l'Université de Paris-Sorbonne.
28. O. Löfgren: *Ambrosian Fragments on an Illuminated Manuscript containing the Zoology of al-Gabiz*; 1946, Uppsala, Almqvist & Wiksells.
29. See O. Löfgren: *Ambrosian Fragments*, Plate xvi (Note 28) and R. Ettinghausen: *Arab Painting*, p. 157 (Note 6).
30. A. S. M. Harun (ed.): *Kitab al-bayawan ta'lif 'Abi 'Uthman 'Amr ibn Bahr al-Djabiz*, vol. I, 198; 1938, Cairo; O. Löfgren: *Ambrosian Fragments*, p. 30 (see Note 28).
31. Munich, Cod. arab. 464, fol. 196r.
32. M. M. Sadek: *The Arabic Materia Medica of Dioscorides*; 1983, Québec, Les éditions du Sphinx.
33. M. M. Sadek: *The Arabic Materia Medica*, Fig. 44, p. 191. The crested lark is the second bird illustration from the top.
34. E. J. Grube: 'Materialien zum Dioskurides Arabicus', in *Aus der Welt der islamischen Kunst. Festschrift für Ernst Kühnel*, (ed. R. Ettinghausen), Fig. 14; 1959, Berlin, Gebr. Mann.
35. K. Weitzmann: 'The Greek sources of Islamic scientific illustrations', in *Archaeologica Orientalia in Memoriam Ernst Hertzfeld*, (ed. G. Miles), Plate xxxv, Fig. 10; 1952, New York, NY, J. J. Augustin; E. J. Grube: 'Materialien', Figs. 12 and 13 (see Note 34).
36. There are striking similarities between other animal illustrations in these two Dioscurides manuscripts and in the Munich manuscript. A discussion of these similarities goes beyond the scope of this article.
37. A. Contadini: 'A bestiary tale: text and image of the unicorn in the Kitab Na't al-Hayawan (British Library, Or. 2784)', *Muqarnas*, 2003, 21, 18.
38. London, British Library, Or. 2784, fols. 4v–60r and 214r–235r.
39. Cf. also the picture of the kite in D. Brandenburg: *Islamic Miniature Painting in Medical Manuscripts*, Fig. 94; 1982, Basel, Roche.
40. Z. Kádár: *Survivals of Greek Zoological Illuminations in Byzantine Manuscripts*, chapter III: 'The illustrations for the Ornithiaca (Ixeutica seu de aucupio) of Dionysius and its paraphrase', 77–90, 87; 1978, Budapest, Akadémiai Kiadó.
41. See Z. Kádár: *Survivals*, Plate 122, Fig. 2 (stork), Plate 124 (Ross's gull and cormorant), and Plate 125, Fig. 2 (kingfisher) (Note 40). There are three fish in the Ross's gull's pond.
42. Z. Kádár: *Survivals*, Plate 128, p. 81 (see Note 40).
43. Cf. E. Hoffmann: 'The beginnings of the illustrated Arabic book: an intersection between art and scholarship', *Muqarnas*, 2000, 17, 146 on the earliest surviving Dioscurides manuscript: 'a work probably executed by a non-artist, contained drawings of a solely practical nature with evidence of classical textual rather than artistic inspiration'.
44. S. von Hees: 'Adja'ib al-makbluqat (see Note 4).

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