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The Zoology of the classical islamic culture

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Abstract

This article brings a survey of research on the science of zoology in the Classical Arabic/Islamic Culture as revealed in texts on this subject written in Classical Arabic from the second half of the 8th century to the 15th century A.D. In the light of recent research and by use of examples from the Arabic texts themselves, a new evaluation on the scientific content of these texts will be proposed.

The traditional view on Classical Arabic Biology by Historians of Science and Orientalists.

This article will not treat of the animal classification found among authors of classical Adab, as these have been object of thourough genereal introductions by Ullmann[1] (1972) and Eisenstein (1991)[2]. Recently, more detailed investigations on the classifications of animals have been achieved by A. Aarab, P. Provençal and M. Ben Saad (see further down). It will rather try to determine the state of zoology as a science as it is revealed in Classical Arabic texts written form the second half of the 8th century to the 15th century A.D. It is well known that the *adab* -authors used a pragmatically and anthropocentric

[1] Manfred ullmann: Die natur-und geheimwissenschaften im islam handbuch der orientalistik. E. J. Brill (leiden 1972).

[2] Eisenstein, H. 1991: Einführung in die arabische Zoographie. Dietrich Reimer Verlag: Berlin. Eisenstein, H. 1989: Tierkundlichen Mitteilungen in der klassischen arabischen Literatur, in: Der orientalische mensch und seine Beziehungen zur Umwelt. Beiträge zum 2. Grazer morgenländischen Symposion (2.- 5. März 1989). Eisenstein, H. 1984: Die Systematik der Säugetiere in mittelalterlichen arabischen Quellen, Sudhoff Archiv, Band 68, Heft 1, pp. 84 - 93.

approach to their treating of the animal kingdom[3]. On the other hand real scientists like Ibn Sīnā or Abdalaṭīf Al Baġdādī had a much more precise notion of the biological realities of the animal and plant kingdoms.

The medieval Arab zoology is in practice almost absent from the books of the history of biology (Petit and Théodoridès, 1969; Mayr, 1989; Hendrik de Wit, 1992, etc..) as well as in the introductions to the texts books devoted to this discipline (Beaumont and Cassier, 1981; Campan, 1980, etc..). In the rare cases when this part of the history of zoology is mentioned, these authors assert that it has not existed. The way they deal with the zoological texts from this period is limited to a description of the history of zoological literature. They always end up with the same verdict: the classical Arab civilisation has not brought anything to zoology and botany, except for a few anecdotes, some geographical accounts or in its relation to hunting practices or finally in matters concerning the licitness or unliciteness, according to the *fiqh*, of the use of animals for whatever purposes. According to these authors, the only merit of the Arabs is to have preserved the Greek scientific heritage before passing it on to Europe.

To grasp the extent of such a judgement, here are a few passages related to medieval Arab zoology, borrowed from some major historians of biology.

First, we are going to begin with Petit and Théodoridès (1969), who, in their ,Histoire de la Zoologie (i.e. History of Zoology), tried to find an explanation to the non-existence of zoology in the Islamic sciences. This is what they wrote :

> "*Referring to Islamic zoology, Carus rightly points out to the fact that because of the prohibition of anatomy (i.e. dissection of bodies) by the Islamic religion and of the representation of human beings having been banished for a long time, the authors who wrote on animals considered them from a very general point of view, and often report fabulous, poetic or religious accounts concerning them.*

[3] Ullmann ibid., Eisenstein ibid.

Mayr (1989)[4], on the other hand, wrote a voluminous work entitled The Growth of Biological Thought where he devoted a small paragraph to the Arab zoology, writing:

> "*Nothing really happened in biology after Lucretius and Galen until the Renaissance. The Arabs, so far as I can determine, made no important contributions to biology. This is even true for two Arab scholars Avicenna (980-1037) and Aberrhos (Ibn Rušd,1120-1198), who showed particular interests in biological matters. It was, however, through Arab translations that Aristotle again became known to the western world. This was perhaps the greatest contribution the Arabs made to the history of biology".*

Another passage borrowed from Hendrik de Wit (1992) has the same negative opinion of both the Europeans and the Arabs in the middle Ages. He writes:

> "*The lack of interest for experimentation, as we understand it nowadays; the total absence of the smallest comprehension of what experimental research may mean in the whole of the world thought during the first millennium, is not particular to the West, because biology in the oriental world was exactly in the same situation. This gap is specific to that epoch; it was world-wide, typical of the beginning of biology which will remain this way until experimentation gradually becomes a key method of biological research.*"

Like Mayr, Hendrik de Wit ascertains that the role of the Islamic civilisation was limited to the safeguard of the Greek biological knowledge thus enabling its transfer to Europe. This author writes:

> "*The Arabs had the extremely deserving behaviour of having allowed to save the irreplaceable heritage of the past all along centuries of confusion and decline, even if their contribution was limited to its translation and*

[4] Mayr, E. 1982: *The Growth of Biological Thought, Diversity, Evolution and Inheritance.* The Belknap Press of Harvard University Press, Cambridge, Massachussets.

> *commentary. But, we cannot talk about some progress, however small it is.*"

Finally, Hendrik de Witt returns to Carus' idea to explain the non-existence of zoology in Islam and affirms that

> "*The Koran has forbidden dissection of animal bodies as well as of representation of human beings (one of the consequences is the dressing habits of the Mahometans which requires hiding all the body*).

Regarding the opinions expressed by orientalists, Manfred Ullmann (1972) expresses the usual way of looking at Classical Arabic[5] texts on biological subjects[6] as he states that a zoology *sensu stricto* that is a scientific knowledge of animals which elaborated its own methods was not found in the Classical Arabic civilisation. He furthermore states that the Arabs likewise did not possess any real or scientific botany. What was to be found was a versatile but practical knowledge of animals and plants[7].

Herbert Eisenstein explains in more details this view of the "knowledge of Animals": This knowledge often did not separate facts from fiction and was determined for its practical purposes by the demands of husbandry, the requirements of *fiqh* regarding legitimate and illegitimate food items, medical purposes and so on.

> "*Thus there existed in this way for the Arabic authors of the Classical Epoch a lexicographic, a medical or a judicial reason for observing and describing animals – and even a reason based in entertainment – but not a scientific one*"[8].

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[5] By Classical Arabic is ment here texts written from the 8tn and the 16th century in Classical Arabic.

6 I.e. here Zoological and Botanical texts as well as more specialised texts as books on hunting, breeding, monographs on certain species like Bees, Horses of Nile Monitors etc. But Medicine sensu stricto is not included.

[7] Ullmann, Die Natur und Geheimwissenschaften im Islam, p. 5 and p. 62.

[8] Eisenstein, H. (1989) Tierkundlichen Mitteilungen in der klassischen arabischen Literatur, in: Der orientalische mensch und seine Beziehungen zur Umwelt. Beiträge zum 2. Grazer morgenländischen Symposion (2. - 5. März 1989) pp. 431-432. Eisenstein has not changed his oppinion markedly

In newer research the contribution of the Clasical Arabic Civilisation to zoology is aknowledged. This may be seen from the works of Aarab[9], Provençal[10] and Ben Saad[11], and in the following this new approach will be used to advance another evaluation of the scientific content of texts on zoology written in Classical Arabic.

This way of looking at the classical Arabic texts concerning animals is only fully justified regarding such an *adab* -text as the *Ḥayāt al ḥayawān* of ad-Damīrī (1344 -

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regarding Arabic Zoology in his book Einführung in die arabischen Zoographie (1990) Dietrich Reimer Verlag, Berlin pp.199-200.

[9] Aarab, A (1999) Etude analytique et comparative de la zoologie médiévale, cas du Kitâb al-Hayawân de Jâhiz (776-868). These d'Etat presenté à l'Université Abd-el Malek Essaadi, Faculté de science de Tétouan.

Ahmed Aarab, P. Provençal and M. Idaomar, Eco-ethological data according to Jâhiz through his work Kit□b al-ˇayaw□n (The Book of Animals), Arabica, 2000 vol. 47, pp. 278-286.

Ahmed Aarab, P. Provençal and Mohamed Idaomar, The mode of action of venom according to Jâhiz through his work Kitāb al-ḥayawān (The Book of Animals), Arabic Science and Philosophy vol. 11 (2001) pp. 79-89.

Aarab, A., Provençal, P., Idaomar, M., « La méthodologie scientifique en matière zoologique de Jâhiz dans la rédaction de son œuvre Kitâb al-Hayawân », Anaquel de Estudios Arabes (2003) : 5-19.

10 Provençal, P. 1995, Enquête lexicographique sur les noms d'animaux en arabe /A lexicographic survey of arabic animal names. Ph. D. thesis, University of Copenhagen. Provençal, P. and U.G. Sørensen, Medieval record of Siberian White Crane Grus leucogeranus in Egypt, Ibis vol. 140 pp. 333 - 335.

Provençal, P. 1992, Observations Zoologiques de Abd al-Laṭīf al Baġdādī , Centaurus pp. 28-45.

Provençal, P. 1995, Nouvel essai sur les observations zoologiques de de Abd al-Laṭīf al Baġdādī, Arabica, Tome XLII pp. 315 -333.

Provençal, P. Marine biological reports in the *Nuḥbat addahr fi 'aǧā'ib al bar wal baḥr*, Arabic Sciences and Philosophy, 2014, vol. 24, pp. 169-180.

[11] Ben Saad, M. 2010 La Connaissance du Monde Vivant chez le savant al-Djâḥiẓ (776-868) : Les Sciences de la Vie, et le regard d'ˇal-Djâḥiẓ dans l'ˇHistoire des Sciences arabes, Thèse pour l'Université Denis Diderot - Paris VII.

Ben Saad, M., Katouzian-Safadi, M., Provençal, P., « Réflexions sur un critère de classification des animaux chez al- Djâhiz (776-868) : le mode de reproduction chez les reptiles et les oiseaux » al-Mukhatabat (2013) No 7 pp. 69-86.

1405). Ad-Damīrī is mentioned here, even though he is a late author for the Classical period, because his book is a typical example of the kinds of work to which Western Orientalism has tried to reduce Arabic zoology. His classification of his material proceeds in the following way:

The animals are described in alphabetical order i.e. each animal name acts as a lexicographic entry. Each name is treated in an independent article. These articles vary considerably in length depending on the amount of material that was available to the author. Each article is furthermore divided in up to seven categories according to the description found in Somogyi (1928)[12] p. 9 and Eisenstein (1991) [13]:

1. The definition of the animal name and its grammatical features, i.e. its plural forms, its *nomen unitatis*, the masculine and feminine pronunciation of the animal name etc. To this is often added the names used for the sexes and the different life stages of the animal.
2. The description of the Animal, i.e. its biological features. Theses descriptions vary widely in scientific value, again depending on the material available to the author. The scale goes from very precise information to *mirabilias*.
3. The mention of the different traditions i.e. *aḥādīṯ* where the animal is used or mentioned. Mostly sound traditions are used (cf. Somogyi *ibid*.)
4. The different legal opinions regarding the use of the animal. All the four Sunni *maḏāhib* are used, and the opinions of *fuqahā'* of other observances are used too.
5. The proverbs where the animal name in question are used.
6. The virtues (*ḫawāṣ*) of the animal and of its body parts, of its excretions and products.
7. Finally mention is made of the interpretation of the animal when seen in dreams. For most of these

[12] Somogyi, J, d. 1928. Index des sources de la *Ḥayāt al ḥayawān* de ad-Damîrî, Journal Asiatique, N° 1 juillet - septembre.
[13] Eisenstein Einführung in die arabischen Zoographie (1991) pp. 133-134.

interpretations the *Qur'ān* is used as key (Somogyi *ibid*.).

Furthermore the author often adorns his descriptions with digressions on different matters. The most renowned instance is the description of the history of all caliphs to the fall of the Fatimids in Egypt (Somogyi 1928 p. 10). It thus becomes clear that the *Ḥayāt al-ḥayawān* is not even a pure lexicographic work but rather a piece of characteristic *adab*-work, intended to entertain as much as inform[14], and that the main objective of the author was not a description of animals in our zoological sense of the word but on the contrary it was a description of the *cultural importance and significance of the animals mentioned.*

The biology of the Classical Arabic Period, its sources:

The zoology of the Classical period has two main sources: 1.The empirical knowledge not the least stemming from the experience of the desert Arabs, and 2. Classical Greek science. The people living in the deserts, oases and town of Arabia in preislamic and early Islamic times were completely dependent on a thorough knowledge of their environment in order to survive. Their intimate knowledge of desert nature, its plants and wildlife is attested in *Ğāhiliyyah*-poetry e.g. the last part of the *mu'allaqah* of *'Ubayd Ibn al-Abraṣ al-Asadī* verses 37- 48, where the chase and subsequent catch and killing of a desert fox by an eagle is described very precisely even though it is put in the frame of a typical *qaṣīdah*. This knowledge has been an integral part of bedouin life at all times[15].

Regarding the knowledge of the Bedouins we may quote a modern example: J.J. Hobbs (1989) provides a recent quotation from a man of the *Ḫušman* clan of the *Ma'āzah* tribe regarding the feeding habbits of animals which is strikingly similar in content and disposition to the *aḫbār* or *aḥādīṯ* which is found in the *Kitāb al-ḥayawān* of Ğāḥiẓ (see infra):

[14] This feature is well known, cf. Eisentein, *Einführung*, p. 136.

[15] cf. J.J. Hobbs 1989 *Bedouin Life in the Egyptian wilderness*, The American University press in Cairo, pp. 87-137.

> *"The Egyptian vulture (Neophron percnopterus) eats human feces. The white stork (Ciconia ciconia) eats arābūna lizards (Acanthodactylus spp. and Eremias spp.), ʻayr al-banāt beetles (Adesmia sp.), and the moth larvae which feed upon silli (Zilla spinosa) and rabl (Pullicaria undulata) plants. Sand partridges (Ammoperdix heyi) eat the seeds of hurbith (Lotononis platycarpa) and silli. Sandgrouse (Pterocles spp.) eat seeds of hurbith, gutbi gamh (Astragalus vogelii), gutbi fagāʻa (Astragalus eremophilus), and faynı (Arnebia hispidissima). Brown necked ravens (Corvus ruficollis*) *won't eat human feces but will eat camel dung if it contains grain. Donkeys eat human feces. Foxes eat gerbils, dipodils, and lesser jerboas, and the carcass of goats and gazells, but will not eat ʻayr al-banāt beetles. The fox won't eat a dead dog, or vice versa. Although a dog will attack and kill a fox, he will not eat it. The camel will not eat colocynth gourds; it's too bitter. The donkey will eat both the gourd and the roots, and so will goats; sheep eat only the gourd. The ibex eat its leaves, dried and green gourds, and certainly the roots; but the gazelle eats the green gourd and roots only, not the leaves. The rots contain much water, and the gazelle thrives on them. Of all animals, only the domestic dog will eat its young."*[16]

That Bedouins have an extensive knowledge of their biological surroundings is demonstrated by their knowledge of and precise naming of the plant and animals in their surroundings. Thus during an investigation among the *Muzın* tribe in Sinai the author of this article was provided with 61 animal names where 41 of these were names of fishes and other marine species[17]. Hobbes gathered in all 146 animal names and 210 plant names from the dialect of the *Maʻāzah* Bedouins in the Eastern Egyptian desert[18].

[16] J.J. Hobbs, *Bedouin Life*, p. 93, scientific names of animals are author's addition using the identifications given by Hobbs ibid. pp.128-137.
[17] P. Provençal (1997) Animal names gathered by interviews with members of the Muzın tribe in Sinai, *Acta Orientalia*, pp. 35-46.
[18] J.J. Hobbs, *Bedouin Life*, pp. 117-137.

At the time of the great translations during the Abbasid caliphate this knowledge met the rationalisations and theorising on zoology made by Greek science and of course especially the zoology of Aristotle. The Arabs found that this science was not advocating major contradictions to their prior empiric biology. In fact the translation of Aristotle's zoology provided the philosophic and scientific framework for zoology in the Classical Arabic Civilisation. Especially the writings of Ibn Sīnā show a willingness to treat zoologic matters as a subject which is laid open for scientific/philosophic enquiry in the spirit of Aristotle. The zoology of Ibn Sīnā is in fact divided into 19 chapters corresponding obviously to the 19 books of the Arabic version of Aristotle's zoology[19].

One of the first and most important Arab author whose writings show a synthesis of both Greek and Arab knowledge is *Abū 'Uṯmān 'Amr ibn Baḥr al-Ǧāḥiẓ* (776-868). Even though the subject matter in the *Ḥayāt al ḥayawān* of *ad-Damīrī* is put forward much more systematically than in the *Kitāb al-ḥayawān* of Ǧāḥiẓ (776-868), the field of interest in both works is obviously not primarily a biological one. But it must be emphasised that Ǧāḥiẓ shows much more interest for zoology in itself than does ad-Damīrī[20]. The works of Ǧāḥiẓ contain much precise theorising and rationalisations as well as precise observations and some direct experimentation[21]. He thus formulates new observations and ideas in ecology and ethology regarding the nature of bird migrations, of migration among

[19] Cf. Eisenstein, *Einführung*, p. 117.

[20] Cf. Eisenstein, *Einführung*, pp 121-125 and especiallly Aarab, A (1999) *Etude analytique et comparative de la zoologie médiévale, cas du Kitâb al-Hayawân de Jâhiz (776-868).* These d'Etat presenté à l'Université Abd-el Malek Essaadi, Faculté de science de Tétouan.

[21] See i.a. Aarab, A., Provençal, P., Idaomar, M., « La méthodologie scientifique en matière zoologique de Jâhiz dans la rédaction de son œuvre Kitâb al-Hayawân », Anaquel de Estudios Arabes (2003) : 5-19. See also Ben Saad, M., La Connaissance du monde vivant chez le savant al-Djâhiz (776-868) : les Sciences de la Vie et le regard d'al- Djâhiz dans l'Histoire des Sciences arabes, Thèse Univ. Paris Diderot (2010), Ben Saad, M., Katouzian-Safadi, M., Provençal, P., « Réflexions sur un critère de classification des animaux chez al- Djâhiz (776-868) : le mode de reproduction chez les reptiles et les oiseaux » al-Mukhatabat (2013) No 7 pp. 69-86.

fishes, of the orientation among homing pigeons and other animals together with such ecological observations as the way herbivores share the different plants in a pasture[22]. Of particular interest is the case of animal orientation where the author affirms the existence of a faculty allowing the animals to use a given number of geographical and stellar landmarks enabling them to find their way back home. This affirmation seems to be one of the first in history in treating animal orientation.

Regarding further aspects of Natural History there is e.g. the chapter about the Waral (i.e. the Desert Monitor *Varanus griseus*) where this author writes:

> *"And we will speak about the Desert Monitor (...) People say, that the Desert Monitor kills the Ḍabb (the Spine-tailed Agama Uromastyx spp.) as it is stronger than the latter, better armed and has a slender body. It is said too that the males of this species is lean, and that it is he which jumps on people and blows and threats (...) it is said that the Desert Monitor kills snakes and then eats them without being injured by their venom, and that this feature should be the most extraordinary one concerning this animal, but how may this be such strange a thing considering that the snake charmers here by us, if they find it convenient and are given a penny, can eat snakes cooked, uncooked or dried without being injured by their venom neither more nor less[23] (...) The Desert Monitor does not dig a burrow for itself, but (this species) takes by force the burrows of all kinds of animals, because whenever the Desert monitor enters a burrow its owner flies it. The Desert Monitor robs the dwelling of*

[22] Cf. Ahmed Aarab, P. Provençal and M. Idaomar, Eco-ethological data according to Jâhiz through his work Kitāb al-ḥayawān (The Book of Animals), Arabica, 2000 vol. 47, pp. 278-286. Ahmed Aarab, P. Provençal and Mohamed Idaomar, The mode of action of venom according to Jâhiz through his work Kitāb al-ḥayawān (The Book of Animals), Arabic Science and Philosophy vol. 11 (2001) pp. 79-89. Ahmed Aarab & P. Provençal, The orientation among birds according to Ǧāḥiẓ through his work *Kitāb al-Ḥayawān* (The Book of Animals). Arabic Biology and Medicine vol. 1 (2013) pp25-38.

[23] This way of rationalising is in accordance with the mu'tazilte views by al-Ǧāḥiẓ

> *snakes the same way as snakes seize by force the dwellings of all small ground-dwelling beasts, of birds and (especially) of the Spine-tailed Agama....*"[24] (author's translation).

Much of the biology of the Desert Monitor reported by Ǧāḥiẓ is correct according to modern zoology. The Desert Monitor is a fierce saurian attaining a length of up to 1,5 m[25]. It is a predator living by hunting lizards, rodents and any animal that it may kill. A large part of its diet consists of snakes including large ones like the large whipsnake *Coluber jugularis*[26]. It defends itself violently when attacked by biting and whipping with its tail.

Ǧāḥiẓ was one of the first to recognise the importance of the knowledge of the desert Arabs regarding natural history. In fact he does not accept any notion stemming from the Greek philosophers, even from such an authority as Aristotle, if it does not agree with the observations made by the Bedouins[27]. An other important source of information was observation. This was the case e.g. of animal communication where, through several examples from various animal species, Ǧāḥiẓ has been able to determine different channels enabling these animals to communicate. Thus, he has been able to establish a close link between the richness of the means of communication and the number of needs occurring in a given species. This led him, in the case of a few species, to identify the kinds of cry corresponding to their respective need. Other original aspects stand out from his work, especially in the case of animal

[24] Al-Ǧāḥiẓ Abū ʻṯmān ʻamr ibn Baḥr (ed. 1965-1969) Kitāb al ḥayawān 8 vol. Second ed. Maktabat wa Maṭba'at al Muṣṭafā al-Bābī al-ḥalabī wa 'Awlādihi bi-Miṣr.

[25] Cf. the description given by Brehm-zur Strassen, O. (1913) Brehms Tierleben. Allgemeine Kunde des Tierreichs. Lurche und Kriechtiere - Zweiter Band. Bibliographischer Institut. Leipzig und Wien, pp. 131-138, and by J. Bons, Les lacertiliens du sud-est marocain, Serie Zoologie N° 18. travaux de l'Institut scientifique chérifien. Royaume du Maroc, pp. 63-64.

[26] Stanner, M. (2004) in E. R. Pianca, D. R. King and R. A. King, *Varanoids Lizards of the World*, Indiana University Press, Bloomington & Indianapolis, p. 129.

[27] Ahmed Aarab, P. Provençal and M. Idaomar, La méthodologie scientifique.

reproduction. It is indeed important to note that Ǧāḥiẓ became aware of the existence of diverse reproductive strategies in animal species, which allow the latter to survive. This led him to draw a law relating the size of clutches or litters to the quality of the care received from the parents. Ǧāḥiẓ had therefore set the first elements of the theory of Fischer (1930) about parental investment. In the same field of animal reproduction, Ǧāḥiẓ takes the merit of having drawn attention to a few factors which could have an influence on the problem of reproduction among wild animals living in captivity. These factors had to be taken into consideration to if these wild animals should reproduce succesfuly in captivity.

The other great source to Arabic Natural History was the wealth of greek Scientific and Philosophical texts, that were translated to Arabic during the years form app. 750 - 1000. The most important authority in this respect was Aristotle. The zoological works of Aristotle consist of five books: *Historia Animalium, De Partibus Animalium, De Generatione Animalium, De Motu Animalium, De Incessu Animalium.* Of these, the Arabic translations of the first three books were put together in a single corpus, which was known as *Kitāb al-ḥayawān* or *Kitāb ṭabā'i'u al-ḥayawān* or *Kitāb al-ḥayawān ġayr an-nāṭiq*[28]. The translations took place at the end of the 8th century AD. The identity of the translator remains obscure, and possibly several translations were made. Usually it was aid that ibn al-Biṭrīq was the translator based on the information found in Ibn an-Nadim's *Fihrist*, but philological enquiries in the Arabic text have put this assertion to doubt. Anyway the translation, or one of them if several took place, was made through a Syriac intermediary version[29].

Aristotle's zoology was used as the main work of reference regarding zoological knowledge during the Classical Arabic period. His authority did, however, not remain without any contradiction, especially if the empiric knowledge showed

[28] The last title is perhaps to emphasize the zoological content of the book, as the Arabic philosophers called man the Rational Animal *alḥayawān an-nāṭiq*,

[29] Cf. Brugman, J. and H.J. Drossaart Lulofs (1971), *Aristotle, Generation of Animals, the Arabic Translation ascribed to Yaḥyā ibn al-Biṭrīq.* E.J. Brill. Leiden

that his writings were not correct, but nevertheless, he remained the great teacher in zoology.

Ibn Sīnā wrote himself a zoology as part 8 of his Kitāb aššifā'[30].Ibn Sīnā is himself very close to Aristotle, but his book is not merely a paraphrase of Aristotle, as Ibn Sīnā used his own observations and reasonings in his treating of zoological matters. Ibn Sina's book is substantial and it is a philosophical treating of animals.

Later authors of adab

The texts of e.g. an-Nuwayrī (1279 - 1332) and especially al-Qalqašāndī (1355 - 1418) are of much better quality than the *Ḥayāt alḥaywān* of Damīrī regarding their biological contents. Both these authors are from Egypt from the Mameluke period, and their aims are the same; namely to write extensive *adab*- works using the well known features of these like the adornment of the prosaic texts with verses of poetry in order to produce works that are able to both instruct and entertain. Thus an-Nuwayrī explicitly wrote, that his monumental adab work *Nihāyat al-'Arab fī Funūn al-Adab* that he did not do anything else than compile the works of other people[31]. Nevertheless, his notes on animals especially on birds contain much precise and correct information[32]. The biological information provided by al-Qalqašāndī in his *Kitāb ṣubḥ al-A'šā* is of even better quality as legendary matter is found in even lesser quantity than is the case with an-Nuwayrī. His chapter about animals is put in a cynegetic context, and one cannot help to think that al-Qalqašandī was a man well acquainted with hunting and wildlife. For instance his descriptions of the Bulbul *Pycnonotus barbatus* and the Nightingale *Lucinia luscinia* or *Luscinia megarhynchos* are very fine and precise:

> "*(The Nightingale (al-hazār)): (...) A passerine bird with a beautiful voice. It is also called al-'andalīb. The*

[30] Ibn Sînâ, (ed.1970). *Al-Shifâ'* la Physique, VIIIe. - *Les Animaux (fî Tabâ'i' al-Hajawân)*, Organisation centrale égyptienne pour l'Eddition et la Publication.

[31] Encyclopaedia of Islam 2. ed. art. An-Nuwayrī

[32] Cf. Philippe Provençal and U.G. Sørensen, Medieval record of Siberian White Crane *Grus leucogeranus* in Egypt, *Ibis* vol. 140 pp. 333 - 335.

> *plural is ‘anādil. (The Bulbul): (..) A dark bird bigger than a sparrow, and the "rock variety" is still bigger. It is also called an-nuġār (...) al-ku‘ayt (...) al-jumayl....*" (al-Qalqašandī ed. 1913 - 1922).

These short notes are remarkable because the two groups of birds, the Nightingales and the Bulbuls are constantly mistaken for each other both in much Classical Arabic literature. This has had the effect that these birds are almost invariably confounded in the dictionaries going from Arabic to a European language[33].

Later scientific authors

In the other end of the scale concerning Classical Arab zoologists we have ‘Abd al-Laṭīf al-Baġdādī (1162 - 1231) who belongs to the class of real scientists. It is clear from an analysis of the zoological contents of his *Kitāb al-’Ifādah wal’i‘tibār* that he endorsed an empirical approach to natural science based on direct observations. This he writes explicitly when commenting his refutation of the Galenic dogma of the anatomy of the human lower jaw[34].That he used the same principle when making research about animals becomes clear for instance in his descriptions of the Hippopotamus, the Electric Catfish, the differences between the Desert Monitor and the Nile Monitor[35]. Thus ‘Abd al-Laṭīf al-Baġdādī for example, after having stated the very close affinity between the Nile Monitor *Varanus niloticus* and the Desert Monitor *Varanus griseus,* used specifically a physiological / biological characteristic for separating these two species namely the size

[33] For further commentaries on the Bulbuls and the Nightingales and the misunderstandings regarding the mixing up of these two groups of birds see Philippe Provençal, Note on the zoological identification of the birds named Bulbul, *‘Andalīb* and *Hazār* in Arabic and their translation/zoological identification in some dictionaries, *Acta Orientalia (*1995) vol 56, pp. 31 - 38.

[34] For details of thes well known refutation in the History of Medicine see Jacquart, D. og F. Micheau (1990) La médecine arabe et l'occident médiéval, Maisonneuve et Larose, Paris.

[35] P. Provençal (1992) Observations Zoologiques and P. Provençal 1995 Nouvel essai.

of the respective egg clutches in the two species[36]. This way of establishing taxonomic differences based on physiological traits is on the same path as the methods used to-day.The biological details that he describes and sometimes lays emphasis on, e.g. the relationship between Hippopotamus and Porks, *means that 'Abd al-Laṭīf al-Baġdādī made observations on animals for their own sake.* Concerning for instance an animal like the Nile monitor which was apparently well used as an aphrodisiac, the many correct biological observations, which do not have any pertinence in themselves to the correct pharmacological use of the animal, stand in sharp contrast to compilation of telltale *logoi* and legends which are brought about by ad-Damīrī[37].

Revaluation of the science of zoology in the classical Islamic culture

Even though the Classical Arabic texts do not present a systematisation of the biodiversity of animal life in the way which was inaugurated by Ray and completed by Linné, they show an increased understanding of the complex relationship between living organisms and their environment, which later was much more developed by Buffon, and which inevitably led to the theory of species evolution by natural selection elaborated by Darwin. It is therefore wrong to say, that they do not show, sometimes high levelled, rationalisation and theorising on the structure, functioning and relationship of living organisms. Furthermore they show an awareness of living nature as an entity presenting an intrinsic field of study. We are very far away indeed from the moral bestiaries of the Latin Middle Ages (which were based on the Physiologus).
That such an interest did exist is witnessed by the very fine description of zoology given by the *'Iḫwān aṣ-ṣafā*:

> *"The seventh (of the Natural Sciences) is Zoology. This (science) is the knowledge concerning all bodies which take nourishment, (and are able too) feel and move about, of those beings that walk on the surface of the earth, fly in the air, swim in water or crawl in earth or move about in the another body as the worms*

[36] P. Provençal (1992) Observations Zoologiques, p. 39.
[37] Cf. Damīrī, ḥa*yāt al-ḥayawān* art.*isqanqür* and *saqunqür*

in the bodies of animals or in the inner of plants, of fruits or of seeds and what is like these things. It is the knowledge of the number of their genera and the species[38] *of the genera and the virtues of these species. It is the knowledge of the ways and manners of their development in the wombs, in eggs or in putrid matters*[39]*. It is the knowledge of the manner of the composition of their limbs and the constitution of their bodies, the differences in their shapes, their forming of pair bonds, the varieties of their voices, the incompatibilities of their (different) natures*[40]*, the differences in their natural dispositions and the similarities in their behaviour. It is the knowledge of the times of their sexual activities and mating, of their nest building and their care in raising their young and of their affection towards their offspring while still young. It is the knowledge of their usefulness and harmfulness, of their homelands, their dwelling, their enemies and features and all which is like this.*

The investigations in all these things and research therein all pertain to the Natural Sciences, and so does Medicine, Veterinary Medicine, the art of training mount animals, hunting animals and birds,[41] *agriculture and animal husbandry and the knowledge of the skills in manufacturing (the tools which are*

[38] These terms of genera and species must be understood in the aristotelian way. Nevertheless it is higly probable that the term species naufi covered more or less our conception of animal species.

[39] This conception is accepted by Aristotle (De Generatione Animalium), but was a common popular conception. Especially in the Middle East the way that different aquatic invertebrates may arise from "nowhere" in newly formed rain pools can only be eplained as a spontaneous generation. That these invertebrates passed the dry time as microsocopic eggs higly resistent to dessication is a fact which is impossible to determine without recent instruments of observation.

[40] That is the intraspecific and interspecific agressions; and more popularly the natural enemies of different species.

[41] That is the art of Falconry.

used in these sciences). All enter the (class) of Natural Sciences" (author's translation)[42].

It is hard to imagine a better definition of Zoology. As a reference a quotation from a modern introduction to Zoology is brought here:

> *"What is life? In what ways are the various kinds of animals alike or unlike in structure, internal processes, and modes of life? How do animals carry on their activities? How are many kinds related to one another? How have they evolved? In what ways does man resemble and differ from other living things? How is he affected by animals, and how have his activities influenced those about him? The answers of many of these questions are provided by the* ***science of zoology*** *(Greek zoön, animal + logos, discourse), which deals with animal life"*[43].

From the similarities concerning the two texts it becomes obvious that the Classical Islamic Culture was interested in animal life for its own sake. In the description of zoology given by the *'Iḫwān aṣ-ṣafā* the accent is laid on animal life itself and not on the importance of animal life to man. This means that the text of the *'Iḫwān aṣ-ṣafā* prepares for observations and investigations in the same way that Aristotle does in his biology. That such observations and investigations indeed were carried out has already been stated in the case of the zoology of Ibn Sīnā. If we turn to the chapter about birds written by the *'Iḫwān aṣ-ṣafā* we find a very fine description and introduction to what may be called general ornithology. In fact, in this chapter the authors apply their description of zoology on the class of birds; to cite a few examples:

> *"Among birds there are some which fly rapidly and are always flying all day long like the Swifts an*

[42] *'Iḫwān aṣ-ṣafā* (ed. 1928) *Rasā'il Iḫwān aṣ-ṣafā wa ḫillān al-Wafā*, ḫayr ad-Dīn az-Zarkalı (ed.) al-Maṭba'ah al-fiA¸srabiyyah bi-Miṣr, vol. 1 pp. 206-207. This passage from the *'Iḫwān aṣ-ṣafā* is also quoted in translation to german and in its entirety by Eisenstein, Einführung, p. 200.

[43] Storer, T.I. et R.L. Ussinger, R.C. Stebbins, J.W. Nybakken 1972: *General Zoology.* McGraw-Hill. New York, London, p. 5.

Martins, and there are som which are heavy in flight and (only) fly a little like the Quail. There are some whose watering places lie far away like the Sandgrouse. There are some which travel far like the Raven, and there are some which do not leave their homeland like the Sparrows. There are some which fly during their travel in trains as the trains of camels like the Crane and there are some which fly in parallel rows as the rows of worshippers (in a mosque). Some fly in mixed flocks that are joined together. some fly against the wind, and other ones fly with their backs to the wind (...)"

"Among the birds there are some having fat on their feathers so that they do not separate (to let in water) as (found) in the water birds. Some are shedding their feathers every year and new feathers grow out (instead) on the bird. Some have webs between the toes of their feet.

Among the water birds, some take off from water in their flight, while other ones get out of water and go on land and then fly on.

Among birds some have long legs and long necks and beaks, while other ones have short necks and long beaks. Most birds gather their legs to their breast[44] *when flying, while other ones extend them to the rear along their tail like the Cranes and Storks"*[45] (author's translation).

The descriptions of the biology of animals given by different Arab authors do show a keen sense of natural observations, which were missing from contemporary bestiaries in Europe. In fact one has to go up to John Ray's descriptions to find something which may match with the descriptions given by 'Abd al-Laṭīf al-Baġdādī or al-Qalqašandī and other of the important

[44] The word ßadr must here be understood as meaning all the underparts of the bird.

[45] '*Iẖwān aṣ-ṣafā* vol. 2 pp. 169-173. Most of the ornithological information quoted is correct according to modern science, cf. Storer et al., General Zoology.

Arabic naturalists regarding biological precision[46] (cf.Young 1992 chapter 2).

[46] Young, D.1992: *The Discovery of Evolution*, Natural History Museum Publication - Cambridge University Press, Cambridge.