

SOME ACCOUNTS OF ZOOLOGICAL EXPERIMENTS IN CLASSICAL ARABIC LITERATURE

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Classical Arabic literature presents a great number of accounts concerning animals, dealing especially with their behaviour and also, but less detailed, with their physiognomy. Most accounts are passed on without reference to the observer himself and thus have been transmitted through centuries. Within these descriptions, there is a certain number of references to practical occupations with animals, undertaken also by persons, whose historical background may be traced. This paper is going to deal with such references, excluding, however references to domestic animals and their use to man, although literature on horse and hawks includes many descriptions of practical treatment. Preference will be given to occupations with rarely or never tamed animals, as referred to by classical Arabic authors¹.

¹ Medical treatment is not included. As to dissections (*tašriḥ*) on animals, they were probably not practised by Muslim physicians, cf. E. G. Browne, *Arabian Medicine*, Cambridge 1962 (repr. of the 1921 ed.), p. 36 sq; G. Petit and J. Théodoridès, *Histoire de la zoologie des origines à Linné*, Paris 1962, p. 172; J. Ch. Bürgel, Dogmatismus und Autonomie im wissenschaftlichen Denken des islamischen Mittelalters, in *Saeculum* 23, 1972, p. 43. The Christian physician Yūḥannā ibn Māsawayh (d. 243/857) is said to have done dissections on monkeys, according to Ibn Abī Uṣaybi'a, cf. G. van Vloten, *Ein arabischer Naturphilosoph im 9. Jahrhundert [el-Dschāhiz]*, ... übertragen von O. Rescher, Stuttgart 1918, p. 10; J. Théodoridès, La zoologie dans l'oeuvre de quelques médecins orientaux du Moyen âge, in *Actes du VIII^e Congrès International d'Histoire des Sciences, Florence-Milan 3-9 Septembre 1956*, vol. II, IV^e sezione ..., Firenze-Paris 1958, Collection de Travaux de l'Académie Internationale d'Histoire des Sciences 9, p. 619; Bürgel, *op. cit.*, p. 43 sq.

Practical occupations with animals may be divided into different categories and, even, degrees²: Firstly, observations which happened accidentally, as well as, secondly, intentional verifications and, thirdly, deliberate tests. And one must not forget to mention that it is difficult to draw a line between real scientific aim and, just, curiosity.

Arabic literature deals very often with the first category quoted, observations which happened accidentally, but only very seldom the observers themselves are ascertained. Especially Arabic lexicographers are known to pass on knowledge not derived from practice, like Abū 'Ubayda (d. ca. 209/824-5) who is supposed to have written fifty booklets on horses - without being able to show at least one part on a living animal³. On the other hand, we meet with lexicographers like al-Azharī (d. 309/980). This author, in his *Kitāb tahdīb al-luġa*, noted several observations of his own concerning animals of the Arabian Peninsula, e.g. on the bustard and the number and colour of the eggs of this bird⁴.

Based on observation as well is what the caliph al-Mu'taḍid (reigned 279-289/892-902) and his chamberlain did. They collected butterflies which buzzed around a lamp and found out that there were 72 different shapes of them, according to the account of al-Qazwīnī (d. 682/1283)

² A system similar to the following, referring to al-Ġāhiz' *Kitāb al-ḥayawān*, has just been pointed out in N. Bel-Haj Mahmoud, *La psychologie des animaux chez les Arabes*, Paris 1977, Etudes arabes et islamiques, Série 3, Etudes et Documents VIII, pp. 34-42, where the division is made into *enquête*, *observation* and *expérimentation* (used in a wider sense than according to the definition of experiments in the following discussion), emphasising especially the *methodes de recherches*, but referring also to further occupations with animals.

³ Cf. van Vloten, *op. cit.*, p. 32, note 2; GAS III, p. 364.

⁴ Abū Maṣṣūr Muḥammad ibn Aḥmad al-Azharī, *Tahdīb al-luġa*, ed. 'Abdassalām Muḥammad Hārūn, Muḥammad 'Alī an-Naġġār et al., 15 vols, al-Qāhira 1964-67, vol. 5, p. 36; cf. H. Eisenstein, Die Trappe in der klassisch-arabischen Literatur, in *Wiener Zeitschrift für die Kunde des Morgenlandes* 75, 1983, p. 51.

in his *Kitāb 'ağā'ib al-mahlūqāt*⁵. There is also a series of observations by travellers, who mention and sometimes describe certain animals, even such from outside the Islamic world, like the report of Ibn Baṭṭūṭa (d. 770/1368-9) in his *rihla* concerning Ceylon leeches⁶.

And we know about personal observations made by authors of literature on animals themselves, like those of al-Ġāḥiẓ (d. 255/868-9), the author of the Arabic book on animals *par excellence*, the *Kitāb al-ḥayawān*. He himself observed rats freeing a trapped rat by gnawing parts of the trap⁷. al-Ġāḥiẓ also reports the statements of Muṭannā ibn Zuhayr - obviously the author of a very important book on pigeons⁸ - who describes how female and male pigeons behave towards each other⁹.

⁵ Zakariyā' ibn Muḥammad ibn Maḥmūd al-Qazwīnī, *Kitāb 'ağā'ib al-mahlūqāt wa-ğarā'ib al-mawğūdāt*, *Zakariya Ben Muhammed Ben Mahmud el-Cazwini's Kosmographie, Erster Theil, Die Wunder der Schöpfung ...* hrsg. von F. Wüstenfeld, Wiesbaden 1967 (repr. of the 1849 Göttingen ed.), p. 443.

⁶ Abū 'Abdallāh Muḥammad ibn 'Aballāh ibn Muḥammad ibn Ibrāhīm al-Lawātī aṭ-Ṭanġī al-ma'rūf bi-Ibn Baṭṭūṭa, *Tuhfat an-nuzzār fi ġarā'ib al-amṣār wa-'ağā'ib al-asfār*, *Voyages d'Ibn Batoutah*, texte arabe, accomp. d'une trad. par C. Defrémery et R. Sanguinetti, 4 vols and 1 vol. *Index alphabétique*, Paris 1914-26, vol. 4, p. 178; cf. E. Wiedemann, Beiträge zur Geschichte der Naturwissenschaften LIII, Über die Kriechtiere nach al Qazwīnī nebst einigen Bemerkungen über die zoologischen Kenntnisse der Araber, in *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 48 and 49, 1916-17, p. 241 sq; Petit, o. cit., p. 210 sq.

⁷ Abū 'Utmān 'Amr ibn Bahr al-Ġāḥiẓ, *Kitāb al-ḥayawān*, ed. Abdassalām Muḥammad Hārūn, 8 vols, ²Miṣr 1385-89/1965-69, vol. 5, p. 249; cf. Bel-Haj Mahmoud, *op. cit.*, p. 38.

⁸ Cf. GAS III, p. 362.

⁹ al-Ġāḥiẓ, *op. cit.*, vol. 3, p. 165; this report is passim to be found in Arabic literature, e.g. in Ibn Qutayba's (d. 376/889) *Uyūn al-abbār*: Abū Muḥammad 'Abdallāh ibn Muslim ibn Qutayba ad-Dīnawarī, *Kitāb 'uyūn al-abbār*, 4 vols, al-Qāhira 1343-49/1925-30, vol. 2, p. 91; cf. tr. L. Kopf, *The Natural History Section from a 9th Century "Book of Useful Knowledge"*, *The 'Uyūn al-akhbār of Ibn Qutayba*, ed. b F. S. Bodenheimer and L. Kopf, Paris-Leiden 1949, Collection de Travaux de l'Académie Internationale d'Histoire des Sciences 4, p. 67; E. Wiedemann, Beiträge zur Geschichte der Naturwissenschaften XLIII, Naturkundliches aus Ibn Qutaiba, in *Sitzungsberichte der Physikalisch-medizinischen*

al-Marwazī, the author of the *Kitāb ṭabā'ī' al-ḥayawān*, observed a giraffe in Iṣfahān in 474/1081-2¹⁰, and this leads to the second category of occupations with animals quoted, i.e. verifications of former opinions and statements. According to al-Marwazī's report, the giraffe did not show any resemblance with a leopard, although it was said that the giraffe is a hybrid from camel and leopard.

A certain Ibn 'Uqayl (or Ibn 'Aqīl) al-Baġdādī, who, after having travelled to the East, returned with a musk deer (*ġazāl al-misk*), showed scientific interest with regard to the different opinions concerning the musk bag (*nāfiġa*) in the belly of the female, said to correspond to the rennet-stomach (*infaha*) of the kid (*ġady*) (indeed, the musk bag is located on the belly of the male animal). We know about this verification from ad-Damīrī's (d. 808/1405) *Kitāb ḥayāt al-ḥayawān*¹¹. This whole book is, actually, a compilation, except in one case: ad-Damīrī himself examined a fly, because it was said that the left wing contained a germ of disease, while the right wing contained the remedy, and he found out that the fly, indeed, protected itself with the left wing¹². In

Sozietät in Erlangen 47, 1915, p. 106; for the account in ad-Damīrī's *Kitāb ḥayāt al-ḥayawān* cf. Wiedeman, *Beiträge* LIII, *op. cit.*, p. 283; the report is also given in Miḥā'il Ṣab-bāġ's (d. 1816 in Paris) book on pigeons *Kitāb musābaqat al-barq wa-l-ġamām fī su'āt al-ḥamām*, cf. tr. C. Löper *Die Brieftaube, Schneller als der Blitz, flüchtiger als die Wolke, von M. Sabbagh, ... Nebst einem Anhang: Beiträge zur Geschichte der Tauben-Post*, Strassburg 1879, p. 12 sq.

¹⁰ Ṣarāf az-Zamān Ṭāhir al-Marwazī, *Ṭabā'ī' al-ḥayawān*, ms UCLA Ar. 52, fol. 151 b; cf. A. Z. Iskandar, A Doctor's book on zoology: al-Marwazī's *Ṭabā'ī' al-ḥayawān* (Nature of animals) re-assessed, in *Oriens* 27-28, 1981, p. 272; for the ms UCLA cf. A. Z. Iskandar, *A Descriptive List of Arabic Manuscripts on Medicine and Science at the University of California*, Los Angeles, Leiden 1984, p. 75 sq.

¹¹ Kamāladdīn ad-Damīrī, *Kitāb ḥayāt al-ḥayawān, al-Kubrā*, 2 vols, s.l. 1278 H., vol. 2, p. 141 (s.v. *zaby*); cf. tr. A. S. G. Jayakar, *Ad-Damīrī's Ḥayāt al-ḥayawān (A Zoological Lexicon)*, 2 vols, London 1906-08, vol. II/1, p. 266; Wiedemann, *Beiträge* LIII, *op. cit.*, p. 244; E. Wiedemann and A. Grohman, *Beiträge zur Geschichte der Naturwissenschaften XLIX, Über von den Arabern benutzte Drogen*, in *Sitzungsberichte der Physikalisch-medizinischen Sozietät in Erlangen* 48 and 49, 1916-17, p. 48.

¹² ad-Damīrī, *op. cit.*, vol. I, p. 495; cf. tr. Jayakar, *op. cit.*, vol. I, p. 822.

other cases, ad-Damīrī often cites al-Ġāhiz as an authority, e.g. in connection with a passage from al-Ġāhiz' book quoted, a passage on scorpions and their birth out of the mouth, ad-Damīrī says verbatim: "What al-Ġāhiz thinks to be right, is right" (*wa-lladī dahaba ilayhi l-Ġāhiz huwa s-sawāb*¹³).

As was to be expected, al-Ġāhiz himself undertook verifications as well as observations, especially by inquiring authorities. Aristotle had maintained the existence of a snake with heads on both ends of its body, and al-Ġāhiz asked a Bedouin about the real existence of such an animal, which the Bedouin confirmed¹⁴. al-Ġāhiz also asked hunters, why foxes eat hedgehogs in spite of their spines and grease - but the answer did not inform about why this is done, it only explained how¹⁵. Furthermore, al-Ġāhiz asked peasants about the material nests of wasps are made of, and the answer was that the nests were made of the foam on the water, but it was not known whether of the foam itself, of rather of a certain substance that the foam contains¹⁶ (in fact, most kinds of wasps build their nests by using very small pieces of wood mixed with their spittle).

The following shows more than a simple verification by inquiring: Knowing that a dun beetle (*ḡu'al*), put on roses, does not move any more and behaves as if it were dead, and that the animal would move again as soon as put on dung, al-Ġāhiz experimented on dor beetles (*ḥunfusā'*) in like manner, and arrived at the same result¹⁷. al-Ġāhiz is

¹³ ad-Damīrī, *op. cit.*, vol. 2, p. 182 (s.v. 'aqrah); cf. tr. Jayakar, *op. cit.*, vol. II/1, p. 344.

¹⁴ al-Ġāhiz, *op. cit.*, vol. 4, p. 156; cf. L. Kopf, The "Book of Animals" (Kitab al-hayawan) of al-Jahiz (ca. 776-868), in *Actes du VII^e Congrès International d'Histoire des Sciences, Jérusalem (4-12 août 1953)*, Paris s.a., *Collection de Travaux de l'Académie Internationale d'Histoire des Sciences* 8, p. 400.

¹⁵ al-Ġāhiz, *op. cit.*, vol. 7, p. 33; cf. R. Kruk, Hedgehogs and Their "Chicks", A Case History of the Aristotelian Reception in Arabic Zoology, in *Zeitschrift für Geschichte der Arabisch-Islamischen Wissenschaften* 2, 1985, p. 207.

¹⁶ al-Ġāhiz, *op. cit.*, vol. 7, p. 32; cf. Bel-Haj Mahmoud, *op. cit.*, p. 36.

¹⁷ al-Ġāhiz, *op. cit.*, vol. 3, p. 349; cf. Bel-Haj Mahmoud *op. cit.*, p. 41.

also able to disprove another statement viz. that vipers are supposed to dislike rues (*ṣadāb*)¹⁸. From these two quotations it becomes clear that al-Ġāhiz has proved to be an experimenter, trying to verify or to refute former statements¹⁹. And this leads to the third category of personal occupations with animals quoted, i.e. tests with the character of experiments, and without any reference to former statements. Again it is al-Ġāhiz who reports tests he did on his own, as well as others known to him.

Among other things, al-Ġāhiz cut an ear wig (*dabḥāl al-udn*) into two pieces to observe the two halves, but, unfortunately, he lost sight of them²⁰. He broke eggs of vipers into pieces to find out what they contain, and he describes the contents being extremely viscous and abominable²¹. The author himself witnessed the experiment of a certain ʿUbayd ibn aš-Šūnizī, who observed the behaviour of twenty scorpions and twenty mice kept in a glass²². The animals were only fighting each other, in opposition to the statement put forward by al-Ġāhiz that runs: observing a scorpion and a rat (or a mouse), kept in a glass bottle, one sees that the mouse outwits the scorpion by gnawing away the sting of the latter²³.

¹⁸ al-Ġāhiz, *op. cit.*, vol. 7, p. 399; cf. Bel-Haj Mahmoud, *op. cit.*, p. 40.

¹⁹ Also al-Bīrūnī (d. ca. 442/1050) disproved a former opinion by experiments, namely that snakes would lose their eyes by their running out when looking on an emerald, cf. the translation of the passage from al-Bīrūnī's *Kitāb al-ġamāhir fi maʿrifat al-ġawāhir*, in *Al-Bīrūnī, In den Gärten der Wissenschaft, Ausgewählte Texte aus den Werken des muslimischen Universalgelehrten, übersetzt und erläutert* von G. Strohmaier, Leipzig 1988, Reclams Universal-Bibliothek 1228, p. 241 sq; gratitude to Dr. G. Strohmaier, Berlin, for this reference.

²⁰ al-Ġāhiz, *op. cit.*, vol. 6, p. 54; cf. Bel-Haj Mahmoud, *op. cit.*, p. 40 (where, however, the report is seen in connexion with a lizard quoted before).

²¹ al-Ġāhiz, *op. cit.*, vol. 4, p. 170; cf. Bel-Haj Mahmoud, *op. cit.*, p. 40.

²² al-Ġāhiz, *op. cit.*, vol. 5, p. 248; cf. Bel-Haj Mahmoud, *op. cit.*, p. 41.

²³ al-Ġāhiz, *op. cit.*, vol. 5, p. 247 sq; cf. Bel-Haj Mahmoud, *op. cit.*, p. 41.

One also could mention a pseudo-experiment, which al-Ġāḥiẓ reports in his *Kitāb al-ḥayawān*: a drunkard provided different kinds of animals with alcohol, animals like camels, buffaloes, cows, horses, sheep, dogs, and even vultures and snakes, but he does not give any results²⁴.

The most important experiment reported by al-Ġāḥiẓ - known for a long time, but still relevant - was carried out by a certain Muḥammad ibn ʿAbdallāh under the guidance of al-Ġāḥiẓ' teacher, the Muʿtazilī theologian an-Nazzām (d. before 230/845). This experiment went as follows: hot stones and hot iron were thrown before an ostrich in order to find out if this animal could digest or liquefy those after swallowing. The ostrich swallowed several pieces, indeed, but he died from a knife that was given to him recklessly²⁵. an-Nazzām had intended to slaughter the animal after a few days in order to see the result. The famous orientalist R. Paret objected that this might not really be called an experiment on animals, as the subject of research was rather the relation between the substances as well as the nature of heat and fire²⁶. Actually, an-Nazzām supposed that the ostrich could eat hot coal without being hurt, as the heat would die away in the belly of this animal, but he doubted that the ostrich could do the same with hot stones, and that is why he started this experiment or, rather, this series of experiments. So, this is in fact a deliberate experiment and - though there is a reference to former statements - not just a verification, and even R. Paret had to admit this fact²⁷, as also an-Nazzām himself stated that he intended to undertake some "research".

²⁴ al-Ġāḥiẓ, *op. cit.*, vol. 2, p. 228 sq; cf. van Vloten, *op. cit.*, p. 35 sq; M. Ullmann, *Die Natur- und Geheimpwissenschaften im Islam*, Leiden 1972, HO, 1. Abteilung, Ergänzungs-Bd. VI, 2. Abschnitt, p. 20.

²⁵ al-Ġāḥiẓ, *op. cit.*, vol. 4, p. 320 sq; cf. van Vloten, *op. cit.*, p. 28 sqq; R. Paret, An-Nazzām als Experimentator, in *Der Islam* 25, 1939, pp. 228-233; B. Lewin, Djāḥiẓ' djurbok, in *Lychnos* 1952, p. 228 sq; *GAS* III, p. 360 sq.

²⁶ Cf. Paret, *op. cit.*, p. 233.

²⁷ Cf. Paret, *op. cit.*, p. 231 sq.

Trying to draw a conclusion from analyzing the accounts on verifications and tests quoted which may be called experiments, there are several remarkable aspects:

- In certain cases, but, obviously, not very often, animals are objects of examinations.
- Examiners of some importance are especially al-Ġāhiz, who undertook a number of experiments, verifications as well as tests, and an-Nazzām, who undertook an experiment of real importance, especially if one takes into consideration the intention, which was the basis for his experiment. Both examiners are *Mu'tazilīs* and this seems not to be a coincidence, as especially men of the *Mu'tazila* were predestined not to be satisfied with mere speculations on nature, but also to intend to find an answer to certain questions by experimenting on living objects.
- The experiments, as they are, are of a very simple nature, and mostly small animals are objects of the investigations. In most cases, we know about the aim of the observation, but none, or only very few, details concerning the realisation.
- The results of the experiments - if there actually are results - are sometimes quite curious and, apparently, not very reliable, especially the results of some of the verifications quoted.

Finally, these examples of research were of no lasting importance, and knowledge about animals was obviously not increased methodically and according to plan. From today's point of view, this development could not lead to scientific zoology. Instead of it, a kind of zoography emerged in the classical Arabic-Islamic civilization. Mere pieces of information - indeed, also extensive ones - were collected and passed on, but in an uncritical manner. Former knowledge was hardly replaced by results of recent research. Another point of consideration is that the animal was mainly regarded in relation to its usefulness, as also to its noxiousness, to man, and so there was no development of an objective scientific zoology (according to today's point of view, as just pointed out). Only a few experiments like those quoted differ from this usual attitude.