

**Predatory and anti-predatory  
strategies according to Ğāḥiẓ**

**through his work**

***Kitāb al-ḥayawān***

**(The Book of Animals).**

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The aim of this paper is to present some zoological data as treated in *Kitāb al-ḥayawān* (Book of Animals) by Ğāḥiẓ. It's a book composed of seven volumes of approximately 400 pages each.

This Arab scientist of the 8<sup>th</sup>/9<sup>th</sup> century gave data about various aspects of zoology, but we are limited in this study to those, which are linked to predatory and anti-predatory strategies.

Ğāḥiẓ was interested in the instinctive recognition that exists between predators and their preys<sup>2</sup>. Many predatory techniques are described by Ğāḥiẓ to illustrate the diversity in the predator's behavior. We will talk about: predation by homotypy, predation by fetid odour emission, hunting by lying in wait without traps, hunting by lying in wait with traps and cooperative hunting

Ğāḥiẓ also undertook a general analysis on various means and strategies adopted by animals to defend themselves.

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<sup>2</sup> *Al Ḥaywān*, vol. VII, pp. 184-85

This author points out to the fact that each animal "knows" the means to be used to attack or defend itself. Ğāḥiẓ has given us many examples illustrating animal anti-predatory strategies such as: "*taḍnīb*" or tail whipping movement, "pretense" behaviors, cooperative defense, "*tawbīr*" or tracking down, "*tamāwout*" or behavior simulating death, dissuasion, multiple entrances and exits, defense using fetid odor emission, defense using viscous excrements, defense using thorns, and finally, resorting to hiding places

Ğāḥiẓ described predatory strategies in a remarkably precise way; the same accuracy can be noticed in his observation description of certain anti-predatory strategies.

This great number of animal adaptations, as described in *kitāb al-ḥayawān*, that allow predators to catch their prey, and preys to escape from their predators or to protect themselves, enabled Ğāḥiẓ to carry out an interesting reflection on the behavior of species that are part of a food chain and which are hence both predators and preys. These species must maintain a certain balance between the two situations to ensure their survival.

### **Predator-prey recognition**

Ğāḥiẓ was interested in the instinctive recognition that exists between predators and their preys. In a passage from his book *Kitāb al-Ḥaywān*, we find a series of questions related to the way predators distinguish their preys from other animals.

In one passage<sup>3</sup> Ğāhiz reports that, every predatory species has its own way of hunting down its prey. The preys recognize their hunters and adopt the most adequate way of escaping. In the same manner, the predator is able to distinguish the sick animal from the healthy one. To illustrate the latter aspect, Ğāhiz gives the example of the oryx predation by dogs stressing the fact that these predators immediately recognize the weakest individuals from the strongest ones as well as males from females.

### **Predatory techniques**

Many predatory techniques are described by Ğāhiz to illustrate the diversity in the predator's behavior. We will talk about a few of them:

### **Predation by homotypy**

We refer to homotypy when an animal takes the form of an object; this enables it to dissemble. Most examples can be found among insects which are capable of imitating all sort of vegetal organs such as barks, leaves and branches. Owing to their usual position as well as their immobility, these animals are greatly able to increase their resemblance with the branch that supports them.

Ğāhiz describes an interesting predation case. It concerns predation by homotypy practiced by a desert snake species. Ğāhiz reports that in the desert of Bal 'Anbar, there is a

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<sup>3</sup> *Ibid*, vol. II, pp. 117-119

snake which hunts sparrows and small birds in the following way:

*"During the midday sun, when nothing can walk or land on the sand, this snake thrusts its tail into the sand and sits up straight like a spear or the stem of a tree. If a bird or a locust wants to land, it would do it on that stem rather than on the scorching sand. This way, the animal is trapped by the snake. If the prey is an insect, the snake will maintain this position and will keep on hunting other insects until it is satisfied. In the case the prey is a bird which is quite filling, the snake will stop its hunt."*<sup>4</sup>

#### **Predation using protective thorns**

This predatory behavior is described in the hedgehog and the porcupine. Both species attack venomous preys such as snakes. When it takes hold of the snake's queue, this kind of animal withdraws into itself and starts to devour it. The snake can't attack the predator because of its thorns.<sup>5</sup>

#### **Predation by fetid odor emission**

As far as this aspect is concerned, we find in some passages of *Kitāb al Ḥaywān* a description of the predatory behavior with polecats towards the uromastix or its progeny. This animal goes to the entrance of the uromastix's nest and

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<sup>4</sup> *Ibid*, vol. IV, pp. 107-108

<sup>5</sup> *Ibid*, vol. VI, pp. 373-374

gets into it walking backwards until it completely obstructs the nest entrance. Then the polecat produces a fetid gas. According to the author, three foists are sufficient to make the prey faint.<sup>6</sup>

### **Hunting by lying in wait**

#### **Hunting by lying in wait without traps**

As to this technique, the first example we are given is the one concerning fly predation by the wasp. The wasp waits for the fly to land on feces and chooses the moment when its prey is busy with its coprophagous behavior to capture it.<sup>7</sup>

In a second example, Gāhiz evokes the case of hunting by lying in wait as practiced by a kind of jumping spider called "Leith" (Lion); he writes: "*There is a third kind of spiders which hunts flies like the cheetah. It is called the "lion". This spider has six eyes. When it sees a fly, it lies in wait for it pressing itself against the ground, without moving its legs. If it jumps to seize it, it never misses it. This species hunts domestic flies only and as such, presents a real plague for them*".<sup>8</sup>

Finally, in another passage, Gāhiz speaks of the mole as a deaf and blind animal which only uses its olfactory sense to recognize whoever approaches it. This species positions itself at the entrance of its nest with its mouth open. If a fly falls inside it, the mole catches it by aspirating it and closing its mouth. This kind of predatory behavior takes place, according

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<sup>6</sup> *Ibid*, vol. VI, pp. 47, 371-372

<sup>7</sup> *Ibid*, vol. I, p. 239

<sup>8</sup> *Ibid*, vol. V, p. 412

to Ġāḥiz, not at night but during the day when flies are numerous. The mole eats the number of flies it needs and always knows the right moment for hunting and the necessary quantity of flies it requires.<sup>9</sup>

### **Hunting by lying in wait with traps**

This technique is described by Ġāḥiz as practiced by two kinds of spiders. The first one performs a rudimentary weaving while the other one is characterized by a very thin and elaborate weaving. The two kinds of webs function as a trap to catch preys. He writes:

*“Among spider types, there is one whose organization is mediocre because it weaves its web at the surface of the ground and on rocks. This constitutes a covering whose sticking ends are buried on the ground. If a prey happens to fall in this web (flies or similar kinds), the spider catches it.*

*There is another kind of spiders which elaborate their web with great precision, building it up in elevated places only. This spider spreads its filaments towards fixation spots situated at the level of corners and pillars, the main lines converging towards the center. Then, it incorporates other threads between the main radii so as to support them. The trap is therefore found in the center of the web. If a fly falls inside it and moves about, it finds itself suddenly trapped. Once it is sure its*

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<sup>9</sup> *Ibid*, vol. VI, p. 411

*prey has been weakened, the spider takes it to its storing place, and if it is hungry, sucks its fluid and throws it away. Finally, it restores the damaged parts of the web.*

*Most of the preys fall inside the trap at sunset.*

*It should be stressed here that it is only the female which undertakes the weaving. The male is only capable of ruining the web.<sup>10</sup>*

### **Cooperative hunting**

As far as this kind of predation is concerned, Ġāhiz writes about the existence of hunting where wolves cooperate and the various members of the group communicate between them. The author notes that wolves resorts to this kind of strategy when they are unable to act alone. He stresses the fact that when a man is the target of such collective hunting, he can't escape.<sup>11</sup>

### **Anti-predatory behavior**

We will first start by referring to a general analysis undertaken by Ġāhiz on various means and strategies adopted by animals to defend themselves. This author points out to the fact that each animal "knows" the means to be used to attack or defend itself. He writes:

*"..... The polecat uses fizzes, and the hubara bustard*

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<sup>10</sup> *Ibid*, vol. V, pp. 411-412

<sup>11</sup> *Ibid*, vol. VI, p. 408

*viscous excrements. The rooster has its spur. The hedgehog knows that its long thorny skin protects it. In the same way, the porcupine uses its long thorns both for protection and in its predatory behavior. These thorns can be thrown with precision like arrows by this animal. As to the wasp it has nothing but its sting to defend itself. The same applies to the Scorpio. Birds of prey know that their weapons are their claws. Dogs and wolves' only arm is their jaws. Snakes and boars can use their canines only. Bulls, rams and goats have nothing except their horns to attack. In the case when the latter have no horns, they are obliged to attack from the place where these would normally grow, namely, the forehead. Horses use their mouth and hoofs to defend themselves while crocodiles can use their tail to push their victim in the water. The uromastix can defend itself better when it uses its tail rather than its claws. Other animals which have no arms to defend themselves run away for their safety. These are animals which are able to run very fast like dears and hares."*<sup>12</sup>

### **Anti-predatory strategies**

In addition to this general analysis of the various defense means that can be found in animal species, Ğāḥiẓ has given us many examples illustrating animal anti-predatory strategies. We are going to present a few cases.

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<sup>12</sup> *Ibid*, vol. VI, pp. 373-379

"*Tadnib*" or tail whipping movement

Ğāhiz talks of the Uromastix's use of the tail to defend itself against snakes. According to this author, it is a hard and rough tail as efficient as the claws of a bearded vulture. The uromastix uses its tail to defend itself through a kind of behavior called "*Tadnib*". This behavior is characterized by a tail whipping movement directed against an aggressor wanting to enter its nest. This movement of the tail can cut and even kill a snake.<sup>13</sup>

### " Pretense" behaviors

Behaviors that serve to mislead a predator are called "pretense" behaviors (Eibl-Eibesfeld, 1984). This type of behavior is described by Ğāhiz in order to illustrate the strategy adopted by the partridge to protect its nest. He writes:

*" When a hunter approaches the nest of a partridge while it is accompanied by its progeny, the partridge runs in an obvious way to attract him distracting him from its progeny which will take this opportunity to return to the nest. Thinking that the partridge is within his reach, the hunter follows it. Once the latter is far from the nest being thus unable to find it again, the partridge will fly away."*<sup>14</sup>

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<sup>13</sup> *Ibid*, vol. VI, pp. 121-122

<sup>14</sup> *Ibid*, vol. III, pp. 184-186

Lastly, Ğāḥiẓ points to the fact that, like nest building species when they generally find it difficult to orientate themselves, the partridge emits calls that are specific to it when it approaches the vicinity of its nest in order to gather its progeny around it.<sup>15</sup>

### **Cooperative defense**

Concerning this defense case, Ğāḥiẓ gives us a description of the way sparrows protect their chicks. It is a defense which takes place collectively. Thus, for example, if a sparrow sees a snake getting near its nest to devour its eggs or chicks, it starts to emit calls and to flutter its wings. Once they hear these calls, each sparrow joins its congener showing the same behavior as the latter and manage this way to chase the snake.<sup>16</sup>

It should be noted here that another case of collective defense behavior, has been described by Ğāḥiẓ, this time among the Hubara bustard.<sup>17</sup>

### **"*Tawbīr*" or tracking down**

First, Ğāḥiẓ defines "*Tawbīr*" as being a particular way of walking characterized by the retraction of the claws while resting on the plantar pellet so as not to leave any trail. According to this author, this behavior exists only in small

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<sup>15</sup> *Ibid*,

<sup>16</sup> *Ibid*, vol. V, pp. 210-212

<sup>17</sup> *Ibid*, vol. VII, p. 60

carnivorous animals which don't want their trail to be traced by either their predators or their preys.<sup>18</sup>

In another passage, Ġāhiz applies the term *Tawbīr* to other animals such as the hare or the jerboa and hence defines it as being a walking behavior characterized by resting on the posterior part of the paw in order not to leave any track on the soil.<sup>19</sup>

Last, the author speaks of the *tawbīr* adopted by the jerboa in constructing subterranean tunnels, this way hiding the entrance with sand to mislead its predators. When walking, this species also rests on hairs existing at the level of its heels. According to Ġāhiz, other animals use the *tawbīr* while walking so as not to leave trails on the sand.<sup>20</sup>

### **"*Tamāwut*" or behavior simulating death**

Ġāhiz reports the observation of a Bedouin about *Tamāwut* behavior (pretending to be dead) used by the fox to escape from its hunters. This animal immobilizes itself and swells up as if it had died one or two days before. Then at the right moment, it will run away.<sup>21</sup>

### **Dissuasion**

Concerning this kind of dissuasive behavior Ġāhiz reports the case of a kind of non-venomous and harmless snake

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<sup>18</sup> *Ibid*, vol. VI, pp. 351-352

<sup>19</sup> *Ibid*, vol. VI, p. 357

<sup>20</sup> *Ibid*, vol. V, pp. 277-278

<sup>21</sup> *Ibid*, vol. VI, pp. 305-306 ; VI, pp. 312-313

called Huffāt. This animal swells up and starts hissing dissuasively before it springs on its aggressor to intimidate it. Those who don't know this animal will be scared of it more than if it were a venomous snake.<sup>22</sup> This kind of reptile has been identified by Maalouf (1935) as being the Coluber.

In a different passage Ġāḥiẓ reports that, according to a poet, the chameleon uses dissuasion to intimidate its aggressor. However, he points to the fact that to his knowledge, this behavior is rather noticed in the monitor lizard adding that this poet was the only person who reported the case of the chameleon to him.<sup>23</sup>

### **Multiple entrances and exits**

Another strategy is described in the jerboa which avoids its predators by digging a variety of entrances and exits in its hole.<sup>24</sup>

### **Defense using fetid odor emission**

This case is reported in the polecat, which emits a fetid gas to defend itself. According to Ġāḥiẓ, the polecats foists are so dreadful that if they are emitted in the middle of a herd of camels, they will cause these animals to disperse making it quite hard to gather them again.<sup>25</sup> In another passage, this author evokes the case of the beetle which defends itself by

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<sup>22</sup> *Ibid*, vol. VI, p. 345

<sup>23</sup> *Ibid*, vol. VI, p. 368

<sup>24</sup> *Ibid*, vol. VI, pp. 388-389

<sup>25</sup> *Ibid*, vol. VI, p. 373

emitting foists.<sup>26</sup>

### **Defense using viscous excrements**

This strategy was described in the fox as well as in the Hubara bustard. In a first passage, Gāhiz speaks about a second defense means used by the fox which consists in using its excrements against its aggressor. According to this author, these excrements are more sticky, putrid and abundant than those of the Hubara bustard.<sup>27</sup>

In another passage, we learn that the only means of defense that the Hubara bustard has is its excrements which can be found in a reservoir inside this bird. These excrements are of a sticky and very nauseating nature. The Hubara bustard uses them whenever it needs to protect itself against birds of prey which will in this situation feel much heavier and unable to hunt.<sup>28</sup>

Finally, in a last passage, Gāhiz reports that according to Abu 'Obeidah, the Hubara bustard launches very sticky excrements from its behind to defend itself when it is attacked by a falcon, immobilizing it this way. Then other Hubara bustards come and start plucking out its feathers one by one until it dies.<sup>29</sup>

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<sup>26</sup> *Ibid*, vol. VI, p. 468

<sup>27</sup> *Ibid*, vol. VI, pp. 312-313

<sup>28</sup> *Ibid*, vol. VI, p. 373

<sup>29</sup> *Ibid*, vol. VII, p. 60

### Defense using thorns

Ġāhiz also speaks about thorns being used as defense means used by the hedgehog and the porcupines. According to the author, the porcupine is capable of casting its long thorns in the same way as with a bow.<sup>30</sup>

### Resorting to hiding places

Ġāhiz refers to certain animals that resort to hiding places when they find themselves in a difficult /vulnerable situation. Among the illustrations he gives of such behavior, he shows the example of the cervidae, which disappear when their woods fall, and reappear again once the latter have grown up and strengthened.<sup>31</sup>

### Discussion

In the pages above, we have been able to see the great number of animal adaptations, as described in *Kitāb al-Ḥaywān*, that allow predators to catch their prey, and preys to escape from their predators or to protect themselves. This enabled Ġāhiz to carry out an interesting reflection on the behavior of species that are part of a food chain and which are hence both predators and preys. These species must maintain a certain balance between the two situations to ensure their survival.

In addition, Ġāhiz's descriptions concerning predatory

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<sup>30</sup> *Ibid*, vol. VI, pp. 464-465

<sup>31</sup> *Ibid*, vol. VII, pp. 42-43

and anti-predatory strategies were generally fairly accurate.

Thus, cooperative hunting as described by Gāhiz in the jackals is quite exact. In fact, this hunting strategy has been stressed in the last few years especially in wolves and lions. We now know that wolves, which very often hunt in groups, follow a different strategy according to whether they are dealing with a bulky prey such as an elk/moose-deer or a less big but fast prey such as the caribou. In the latter case, the wolves seem to organize relays: a first group drives the Caribou toward the ambush set up a few kilometers further down, and when the predators are nearly exhausted, a fresh group follows suit. Without this, the wolves would have no chance of catching the caribou which largely outruns them in the race. It is also believed today that the regular and modulated howling emitted by hunting wolves are interpreted by their congeners from a distance in the same way as when huntsmen with hounds interpret the sound of the horn. The lions or more precisely the lioness whose strategy seems more developed, hunt/ chase game in groups of two or three and are able to drive it toward a vale without a way out (Chauvin, 1997).

However, in the case when the prey does not represent any danger, the wolf acts alone, practices lying in wait and once it is near the game, springs on it and catches it from the throat (De la Fuente, 1996).

On the other hand, the descriptions we have of the spiders and their traps are remarkably accurate as well. Indeed, webs that are specific to spiders take a variety of forms and

arrangements. A few spider species can only construct a web covered of debris placed on the soil to which they mingle. When a prey happens to walk on it, the spider attacks from underneath. But the most complex spider webs are built up in the form of a wheel. In this kind of webs, once the spider has made the first three rays, it weaves new rays as well as the primary frame starting from the center. This way a string in the form of a ray starts growing. In it, the spider builds up its capture spiral which contains drops for capturing its preys.

Concerning Ğāhiz's description of the predatory behavior of the hedgehog, we can notice that except for a few details, it is true. Indeed, this insectivorous attacks all kinds of reptiles. The ferocity with which this predator hunts vipers has been known for a long time. The hedgehog which is not immune against the viper's venom is used to biting this dangerous animal on the head, avoiding this way its bite. On the other hand, its powerful sharp carapace (armor) provides an efficient protection against the viper's bite (Peruzzo, 1988).

It should be noted here that we have not been able to verify to what extent a few predatory strategies presented by Ğāhiz are accurate. A few cases are presented hereafter.

Thus, we have not been able to confirm the strategy adopted by the polecat against the *Uromastix*. What is known is that this species uses bad odor to defend itself.

Likewise, we have not been able to verify the kind of predation of flies described in wasps. What is certain is that this species is mainly carnivorous, often attacking beehives and

killing and devouring many bees and taking away some honey.

The same can be said about fly predation as observed in the mole. What is in fact known, is that this animal feeds itself on lumbrics and other subterraneous invertebrates. Finally, let's stress the fact that, contrarily to what Ğāhiz thinks, if it true that the mole's eyes have lost all their importance because of the subterranean life, its hearing on the other hand is not diminished, despite the absence of pavilions in its ears. Indeed, the internal ear is very sensitive; moreover, the soil transmits sound better than the air (Peruzzo, 1988).

As was shown above/before, Ğāhiz described predatory strategies in a remarkably precise way; the same accuracy can be noticed in his observation description of certain anti-predatory strategies.

Thus, for the uromatix, we now know for sure that this species uses its tail to defend itself against its predators such as birds of prey and reptiles (De la Fuente, 1976).

Concerning pretense behavior, we know that when a flesh-eating mammiferous approaches a nest, many birds that are brooding or taking care of chicks suddenly fly along the ground and get away from the nest in a very visible way, limping and with wings hanging down as if they had been injured. This takes the predator out of its goal (Eibel Eibesfield, 1984). However, it should be stresses here that pretense behavior described in the partridge was already known by Aristo (Tricot, 1987).

The dissuasion case described by Ğāhiz as a strategy

adapted by reptiles to defend themselves against their predators is presently known in several animal species (Eibel Eibesfeldt, 1984). Indeed, these species show /present/take attitudes and special movements which aim at keeping/taking their predators away. In general, the animal which is threatening gets bigger and this way becomes more impressive. It stands and bristles up its mane, crest, fins, or feathers. These intimidating postures are generally accompanied with threatening shrieks.

Concerning the defense strategy using thorns described in the hedgehog and the porcupine, we know that it has long ago been established that the hedgehog uses its powerful shield against predators such as dogs, foxes and martens. When it feels it is threatened, the hedgehog coils itself on its belly wrapping itself up as a ball offering to its enemy nothing but a thorn covered surface which quickly discourages the aggressor.

As to the porcupine, (*Hystrix critata*), when it is threatened, this animal bristles its very sharp quills which discourages the aggression of the most starving wild beasts.

Nevertheless, it is important to stress that the idea according to which the porcupines are able to throw their quills like arrows against their aggressors is not founded. Such a belief still persists even today among people, though.

The cooperative defense case described by Ğāhiz consists indeed in what is called hassling reactions which are used by sparrows very much to tell off birds of prey. Gathered in flocks, they utter special disapproving shrieks, hurl and fall from all sides on the predator simulating an attack generally

forcing it to run away.

As to the defense through viscous excrements, while this behavior is presently known to be used by the Hubara bustard (Cramp, 1980) we have not been able to verify it in the fox. In addition, this strategy also exists in other animals such as the grass snakes of the *Natrix* kind (Peruzzo, 1988).

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