

## SHORT COMMUNICATION

### Al-Razi's Contributions to Veterinary Medicine; Toxicology Subspecialty

#### Abstract

Veterinary toxicology is one of the subspecialties of veterinary medicine. On the other hand, traditional medical sources also contain veterinary knowledge, entailing human medical information. In this study, we aimed to extract and present relevant information on the part of the history of veterinary medicine, especially veterinary toxicology, through research on Al-Razi's book *Al-Hawi fi Al-Tib*. We queried keywords of poison, poisoning, animal, and related terms in *Al-Hawi fi Al-Tib*. Also, we searched international and domestic databases, including Web of Science, Scopus, PubMed, Google Scholar, SID, and IranDoc, to obtain relevant data. Our results showed that Al-Razi directly mentioned the toxicity of ten toxic plants in the animals. It is suggested that Al-Razi has contributed to the knowledge of veterinary medicine and the subspecialty of veterinary toxicology in particular. Future studies recommended to vet other historical medical sources, including traditional medicine textbooks, to find relevant information about veterinary medicine and veterinary toxicology.

**Key words:** Veterinary, Toxicology, History, Animals, Persian Medicine

Received: 16 Feb 2023; Accepted: 7 Oct 2023; Online published: 1 Feb 2024  
**Research on History of Medicine/ 2024 Feb; 13(1): 71-78.**

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#### Citation:

Aghabeiglooei Z, Rezaei Orimi J, Koohi MK, Amrollahi-Sharifabadi M. Al-Razi's Contributions to Veterinary Medicine; Toxicology Subspecialty. *Res Hist Med*. 2024; 13(1): 71-78.



## Introduction

Like human medicine, veterinary medicine has numerous subspecialties; among them is veterinary toxicology. Veterinary toxicology is the science of the effects of chemicals on animals. This field of veterinary medicine examines the possible risks caused by toxic agents in animals to find appropriate treatments and potential preventive strategies (Gupta, 2012, p. 3). A fast-growing, new branch of science, veterinary toxicology, explicitly aims to minimize the effects and complications of toxic agents in animals, from companion animals and food-producing livestock to exotic and wildlife creatures (Park, et al., 2011, pp. 127-133; Guitart, et al., 2010, pp. 260-265; Plumlee, 2003). Reflecting on the sources of Persian Medicine (PM), the science of toxicology has always been the focus of eminent Persian scholars (Hakims). Indeed, they have dedicated parts of their works to different types of poisons, their pathogenesis, signs, symptoms, treatments, sometimes antidotes, and preventive measures (Orimi, et al., 2022, pp. 1-10; Ardestani, et al., 2017, pp. 11-30). In this study, we aimed to extract and present relevant information on the history of veterinary medicine, especially veterinary toxicology, through research on the book of Al-Razi, *Al-Hawi fi Al-Tib*, and shed light on the findings with the current knowledge.

## Al-Razi's *Al-Hawi fi Al-Tib*

One of the notable PM books is *Al-Hawi fi Al-Tib* (Liber Continens; Continens), written by Abu Bakr Muhammad bin Zakariya Razi (251-313 AH; 865-925 AD), also known as Al-Razi, Razi, or Rhazes. (Figures 1 and 2) (Mahjour, et al., 2018, pp. 18-22). This encyclopedia, compiled in over twenty Arabic volumes, is a comprehensive medical textbook translated into other languages and taught for many years in universities (Mojabi, 2006, p. 873; Ebadi, et al., 2015, pp. 18-27). Al-Razi made significant contributions to the medical sciences by writing the book *Al-Hawi fi Al-Tib* (Shoja, et al., 2009, pp. 1188-1191). The wealth of the scientific contents of this book is in such a way that it is still of interest to modern researchers. Recent literature has witnessed the fact that the contents of *Al-Hawi fi Al-Tib* are analyzed and published to present scientific data (Meyerhof, 1935, pp. 321-372; Zarshenas, et al., 2012, pp. 1001-1002; Shoja, et al., 2009, pp. 1188-1191; Orimi, et al., 2022, pp. 1-10; Mozaffarpur, et al., 2017, pp. 113-118).

## Materials and Methods

Even though *Al-Hawi fi Al-Tib* was primarily intended to provide medical information to physicians to diagnose and treat diseases, including poisoning, and thus, it focused on human medicine; we assumed that it might also have veterinary knowledge. Consequently, this study aimed to search this PM source for information on veterinary medicine and animal poisonings. Queried keywords of “poison”, “poisoning”, “animal”, and relevant terms in Arabic, English, and Farsi were used to find appropriate information in *Al-Hawi fi Al-Tib*. Also, we searched scholarly databases and repositories of Scopus, PubMed, Web of Science, Google Scholar, SID, and IranDoc to find related data.



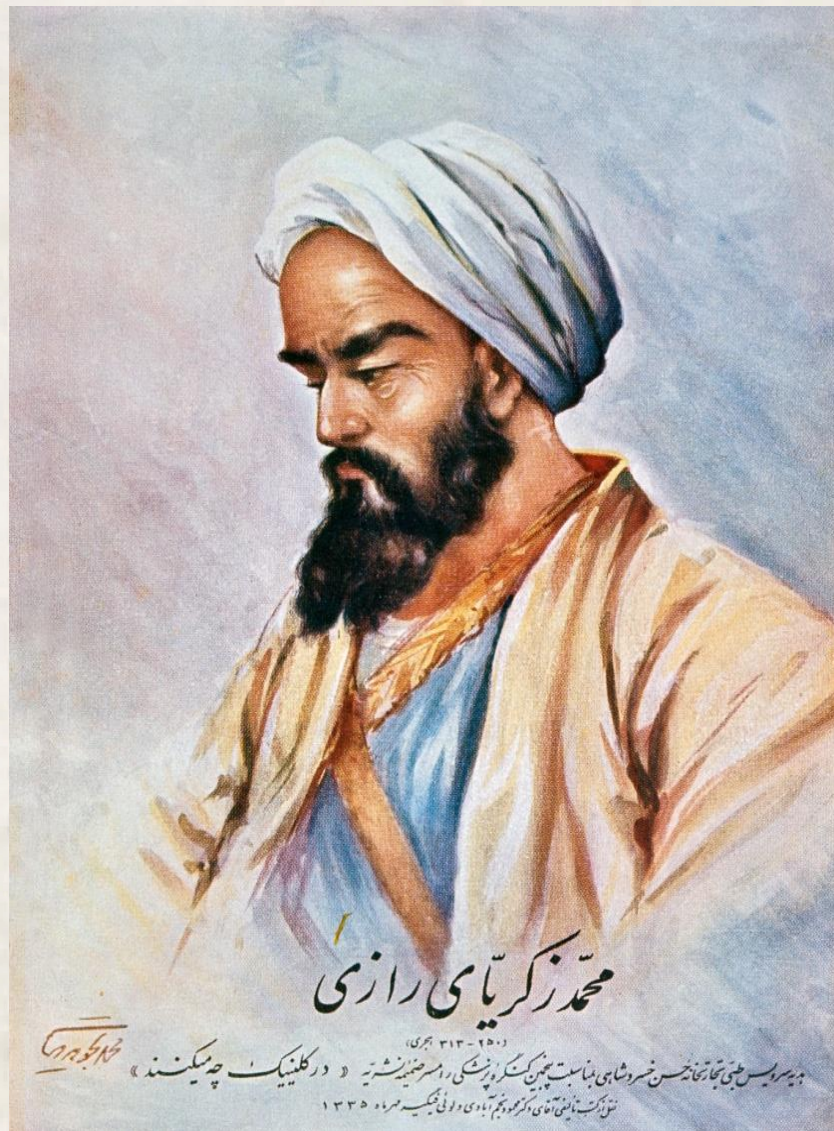


Figure 1. Portrait of Al-Razi (also known as Razi or Rhazes, 865-925 AD), an eminent physician and alchemist of the Islamic Golden Age. Adapted from <https://wellcomecollection.org/works/b2vuuuvj>

## Results

Our findings showed that in the book *Al-Hawi fi Al-Tib*, Razi has discussed at least ten veterinary-related toxicants, which are harmful and sometimes lethal to animals. Moreover, we determined the contemporary data for these toxic agents by available sources in Persian, Arabic, and English (Gupta, 2012, pp. 1031-1079). These toxicants include *Halion* (*Asparagus officinalis* L.), *Theil* (*Theil-e-Kabir*; *Cynodon dactylon*), *Kharbaqe-Sefid* (*Veratrum album*), *La'iya* (*Euphorbia triaculeata* Forsk), *Eshqil* (*Urginea maritima*), *Aqunitoun* (*Khanaq-Al-Nimr*; *Aconitum* spp.), *Lawz* (*Prunus amygdalus*), *Meze-reon* (*Daphne mezereum*), *Defli* (*Nerium oleander*), and *Azad derakht* (*Melia azedarach*) (Al-Razi, 2002, pp. 443, 79, 146, 248, 42, 21, 421, 165, 332). The details of the obtained



data from Razi's *Al-Hawi fi Al-Tib* analysis are presented in Table 1. Also, the data was adapted and compared with the current information in the field of veterinary toxicology medicine.

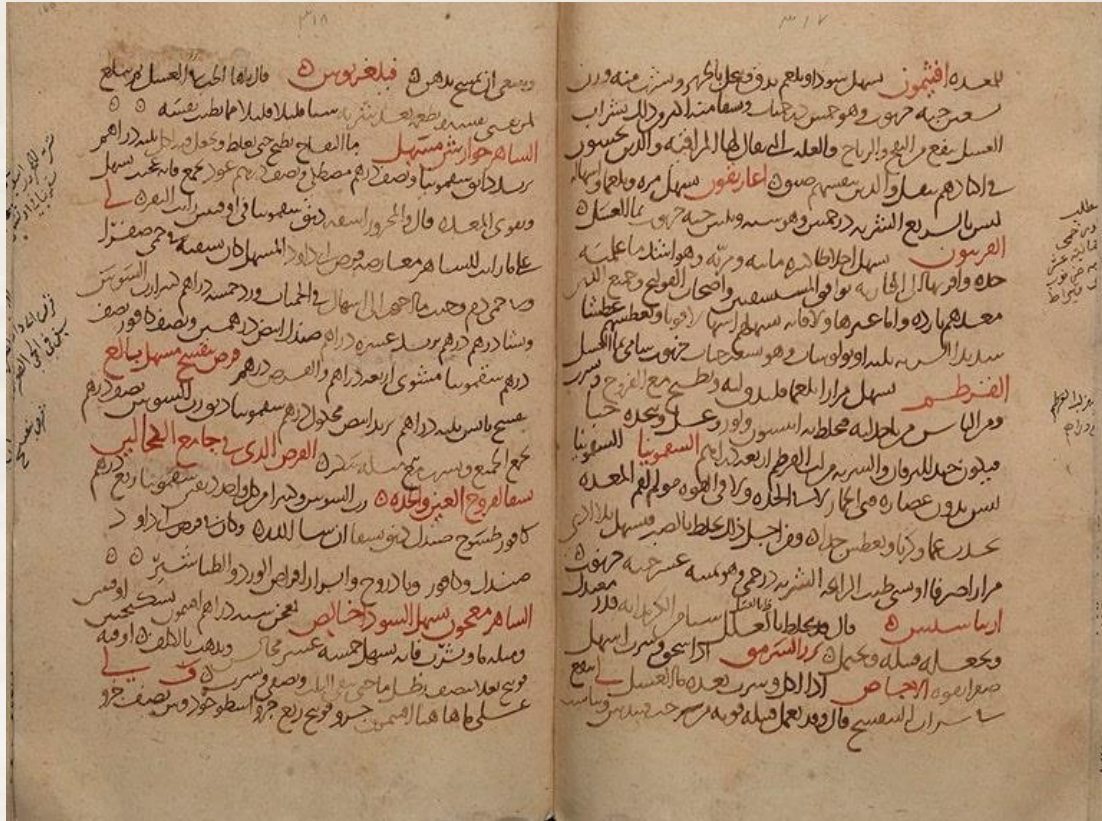


Figure 2. A page from the copy of *Al-Hawi fi Al-Tib* of Al-Razi (*Liber Continens/The Comprehensive Book on Medicine*). Adapted from: <https://isaw.nyu.edu/exhibitions/romance-reason/rrobjects/comprehensive-medicine-purgatives>

### Discussion and Conclusion

The present research elucidated that Al-Razi made a seminal contribution to veterinary medicine and the subspecialty of veterinary toxicology. Conclusively, it is noteworthy to suggest that the history of each field of science determines the identity and importance of that science and its role in human life and well-being as well as animal health and welfare. Therefore, it is recommended to conduct more research on the history of veterinary, in particular, veterinary toxicology, by investigating traditional sources of Persian medicine and veterinary medicine, especially the books *Faras-Nameh* and *Baitar-Nameh* as well as other renowned worldwide sources to gain a more comprehensive understanding of the in-depth knowledge of veterinary medicine and its subspecialties and historical origins.



**Table 1:** Veterinary toxicants that are mentioned in Al-Razi’s *Al-Hawi fi Al-Tib* and adaptation with today’s knowledge

Vernacular Name(s) (Rabizadeh and Okhovat, 2010, pp. 265-286; Ghahreman, and Okhovat, 2004, p. 64; Soltani, 2005, p. 142)	Scientific name	Text of <i>Al-Hawi fi Al-Tib</i> [Arabic] = translation [English] (Al-Razi, 2002, pp. 443, 79, 146, 248,42, 21, 421, 165, 332)	<i>Al-Hawi fi Al-Tib</i> [Volume number; page] (Al-Razi, 2002, pp. 443, 79, 146, 248,42, 21, 421, 165, 332.)	Adaptation to modern knowledge [Veterinary toxicology data]
<i>Halion, Marchobeh, Asparagus</i>	<i>Asparagus officinalis</i> L.	إن طبيخه يقتل الكلاب = <i>The liquid left after cooking will kill dogs.</i>	6; 443	Moderately toxic to pet animals, including cats and dogs.  Clinical signs: vomiting, abdominal pain, tremors, blood, cardiac, reparatory, and kidney problems  (Rojas-Sandoval and Acevedo-Rodriguez, 2022, p. 119056).
<i>Theil-e-Kabir, Marq, Bermuda grass</i>	<i>Cynodon dactylon</i>	و أما الثيل الكثير الورق الذي يقتل المواشى إذا أكلته = <i>A type with many leaves, if eaten by cattle, it will kill them.</i>	6; 79	Highly toxic to grazing animals.  Clinical signs: Tremorgenic syndromes and other problems  (Uhlig, et al., 2009, pp. 11112-11119).
<i>Kharbaq-e-Sefid, White hellebore</i>	<i>Veratrum album</i>	و إذا خلط بالسويق و عجن بالعسل قتل الفأر = <i>If it is mixed with roasted flour and then mixed with honey, it will kill mice.</i>	6; 146	Highly toxic to grazing calves and other animals  (Richter, 1966, pp. 547-549)
<i>La'iyā</i>	<i>Euphorbia triaculeata</i> Forsk	متى دقت و ألقيت في غدير فيه سمكك طفت على الماء كالميتة = <i>If you grind it and pour it into the water tank where there are fish, it will cause the fish to float on the surface of the water as it floats after death.</i>	6; 248	Minimally toxic to animals.  Clinical signs: skin, mouth, eye, and stomach irritations  (Richter, 1966, pp. 547-549; Gupta, 2012, p. 1082)
<i>Eshqil, Squill, Sea onion</i>	<i>Urginea maritima</i>	و يقتل الفأر و هو سم له قاتل = <i>It kills the mouse, and it is a deadly poison.</i>	6; 42	Ingestion is toxic to animals, from mice to livestock El Bahri, Djegham, and Makhlof, 2000, pp. 108-110).



<i>Aqunitoun (Khanaq--Al-Nimr), Monkshood, leopard's bane</i>	<i>Aconitum spp.</i>	و يقتل الكلاب و النمرور و الخنازير و الذئاب متى جعل في اللحم و أكلته؛ و كذلك سائر السباع = If it is mixed with meat and then fed to dogs, leopards, pigs, wolves, and other predators, it will kill them.	6; 21	Extremely toxic to animals. Clinical signs: muscular weakness, vomiting, diarrhea, convulsions, death (Gupta, 2012, p. 238).
<i>Lawz, Bitter almond</i>	<i>Prunus amygdalus</i>	و متى أطمع الثعلب قتله = If it is given to the fox, it will destroy him (It is lethal to the fox).	6; 248	Extremely toxic to animals. Clinical signs: rapid breathing, collapse, death. (Gupta, 2012, p. 1113)
<i>Mezereon, February Daphne, Dwarf laurel</i>	<i>Daphne mezereum</i>	و إذا خلط بالسويق و عجن بالماء و الزيت قتل الفأر و الكلاب و الخنازير =If it is mixed with roasted flour and made into a paste with water and olive oil, it will have a desiccating effect on mice, dogs and pigs and kill them.	6; 421	The toxicity of all parts of this plant was known in veterinary toxicology (Viegi, and Vangelisti, 2011, pp. 999-1000)
<i>Defli, Oleander</i>	<i>Nerium oleander</i>	و قوة زهره و ورقه قاتلة للكلاب و البغال و الحمير و عامة المواشي =Its flowers and leaves are deadly for dogs, mules, donkeys, and other quadruped animals.	6; 165	Extremely toxic to animals. Clinical signs: Vomiting, abdominal pain, irregular heartbeat, breathing difficulty, coma, and death (Barbosa, Fontenele-Neto, and Soto-Blanco, 2008, pp. 279-281). Moreover, according to recent veterinary epidemiologic studies, it is among the most common poisonous agents (Ceci, et al., 2020, pp. 1-11; Cortinovis, and Caloni, 2013, pp. 163-168).
<i>Azad derakht, Neem, Chinaberry, Bitter oleaster</i>	<i>Melia azedarach</i>	و ثمرته رديئة للمعدة قاتلة = And its fruit is bad for the stomach, causing fatality.	5; 332	Its toxic effects are well-known in veterinary toxicology, and this plant is especially neurotoxic (Hare, 1998, pp. 514-516; Ferreiro, et al., 2010, pp. 64-67)

### Conflict of Interest

None.

### References

- Al-Razi, M.B.Z., 2002. *Al-hawi fi al-tibb*. Beirut: Dar Ihya'al-Turauh al-'Arabi.
- Ardestani, M.M., Rahimi, R., Esfahani, M.M., Habbal, O., and Abdollahi, M., 2017. The Golden Age of Medieval Islamic Toxicology. *Toxicology in the Middle Ages and Renaissance*, Elsevier



- Inc., pp. 11-30. <https://doi.org/10.1016/B978-0-12-809554-6.00002-0>.
- Barbosa, R., Fontenele-Neto, J., and Soto-Blanco, B., 2008. Toxicity in goats caused by oleander (*Nerium oleander*). *Research in veterinary science*, 85, pp. 279-281.
- Ceci, L., Girolami, F., Capucchio, M.T., Colombino, E., Nebbia, C., Gosetti, F., Marengo, E., Iarussi, F., and Carelli, G., 2020. Outbreak of oleander (*Nerium oleander*) poisoning in dairy cattle: clinical and food safety implications. *Toxins (Basel)*, 12(8): pp. 1-11. doi: 10.3390/toxins12080471. PMID: 32722138; PMCID: PMC7472096.
- Cortinovis, C., and Caloni, F., 2013. Epidemiology of intoxication of domestic animals by plants in Europe. *The Veterinary Journal*, 197, pp. 163-168.
- Ebadi, N., Masoomi, F., Yakhchali, M., Sadati Lamardi, S.N., Shams-Ardakani, M.R., Sadeghpour, O., Raiesdana, A., and Ramezany, F., 2015. Convoy Drugs in Traditional Persian Medicine: The Historical Concepts of Bioavailability and Targeting. *Trad Integr Med*, 1(1), pp. 18-27.
- El Bahri, L., Djegham, M., and Makhlof, M., 2000. *Urginea maritima* L (Squill): a poisonous plant of North Africa. *Veterinary and Human Toxicology*, 42, pp. 108-110.
- Ferreiro, D., Orozco, J., Mirón, C., Real, T., Hernández-Moreno, D., Soler, F., and Pérez-López, M., 2010. Chinaberry tree (*Melia azedarach*) poisoning in dog: a case report. *Topics in companion animal medicine*, 25, pp. 64-67.
- Ghahreman, A., and Okhovat, A., 2004. *Conformity with the scientific name of an ancient herbal medicine*. Tehran: Tehran University Press.
- Guitart, R., Sachana, M., Caloni, F., Croubes, S., Vandenbroucke, V., and Berny, P., 2010. Animal poisoning in Europe. Part 3: wildlife. *The Veterinary Journal*, 183, pp. 260-265.
- Gupta, R.C., 2012. *Veterinary toxicology: basic and clinical principles*. Oxford, UK: Academic press.
- Hare, W., 1998. Chinaberry (*Melia azedarach*) poisoning in animals. *Toxic plants and other natural toxicants*, pp. 514-516.
- Mahjour, M., Noras, M.R., Khoushabi, A., and Salari, R., 2018. The Role of Digestive Disorders in Melasma. *Trad Integr Med*, 3(1), pp. 18-22.
- Meyerhof, M., 1935. Thirty-three clinical observations by Rhazes (circa 900 AD). *Isis*, 23, pp. 321-372.
- Mojabi, H., 2006. *Reviewing the Shia literature on medical history*. Qom: the Ismailis.
- Mozaffarpur, S.A., Saghebi, R., Khafri, S., and Mojahedi, M., 2017. An Assessment of the Agreement between Persian Medicine Experts on Mizaj Identification. *Trad Integr Med*, 2(3), pp. 113-118.
- Orimi, J.R., Amrollahi-Sharifabadi, M., Aghabeiglooei, Z., Nasiri, E., and Mozaffarpur, S.A., 2022. Rhazes's methodology in the science of toxicology. *Archives of Toxicology*, pp. 1-10.
- Park, J., Sutradhar, B.C., Hong, G., Choi, S.H., and KIM, G., 2011. Comparison of the cytotoxic effects of bupivacaine, lidocaine, and mepivacaine in equine articular chondrocytes. *Veterinary anaesthesia and analgesia*, 38, pp. 127-133.
- Plumlee, K. 2003. *Clinical Veterinary Toxicology-E-Book*. Amsterdam, The Netherlands: Elsevier Health Sciences.
- Rabizadeh, F., and Okhovat, A. 2010. Improving certainty in employment of medicinal plants of traditional medicine by determination of their scientific names. *JITM*, 1(3), pp. 265-286.
- Richter, H. 1966. Poisoning by white hellebore (*Veratrum album* L.). *Wiener Tierärztliche Monatsschrift*, 53, pp. 547-549.
- Rojas-Sandoval, J., and Acevedo-Rodríguez, P., 2022. *Asparagus Aethiopicus (Asparagus Fern)*. Oxfordshire, UK: CABI Compendium. <https://doi.org/10.1079/cabicompendium.119056>



Shoja, M.M., Tubbs, R.S., Loukas, M., Shokouhi, G., and Ardalan, M.R., 2009. Facial palsy and its management in the Kitab *al-Hawi* of Rhazes. *Neurosurgery*, 64, pp. 1188-1191. doi: 10.1227/01.NEU.0000345639.46737.67. PMID: 19487900

Soltani, A. 2005. *Encyclopedia of traditional medicine, medical plants*. Vol. 3. Tehran: Arjmand Press.

Uhlig, S., Botha, C.J., Vrålstad, T., Rolen, E., and Miles, C.O., 2009. Indole– diterpenes and ergot alkaloids in *Cynodon dactylon* (bermuda grass) infected with *Claviceps cynodontis* from an outbreak of tremors in cattle. *J Agricultural and Food Chemistry*, 57, pp. 11112-11119.

Viegi, L., and Vangelisti, R., 2011. Toxic plants used in ethnoveterinary medicine in Italy. *Nat Prod Commun*, 6(7), pp. 999-1000. PMID: 21834243.

Zarshenas, M.M., Mehdizadeh, A., Zargaran, A., and Mohagheghzadeh, A. 2012. Rhazes (865-925 AD). *J Neurology*, 259(5), pp. 1001-2. doi: 10.1007/s00415-011-6398-x. PMID: 22302275.

