

### Abstracts of Persian Articles

#### **Al-Ṭūsī's Recension Method in Comparison to the Maghribī's Recension of Theodosius' *Sphaerica***

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This article examines al-Ṭūsī's and Maghribī's recensions of Theodosius' *Sphaerica* by comparing their features and differences. Al-Ṭūsī adheres to the original text of *Sphaerica*, however, by adding some postulates and three lemmas, he enriches the mathematical structure of the treatise. Al-Ṭūsī's composition style reveals that he intended to prepare a pedagogical textbook, his statements are concise and precise and he presents demonstrations for all the theorems. Several manuscripts of al-Ṭūsī's recension are extant, one of which has been transcribed before his death. The only other extant recension of *Sphaerica* belongs to Muḥyeddīn Maghribī. Maghribī changes the style of the original text by merging some theorems, changing the demonstrations and modifying the diagrams. Although he inserts some additional lemmas into the text, he leaves some simple proofs incomplete. One of the extant manuscripts of Maghribī's recension has been transcribed prior to his death. In sum, we can say that Ṭūsī's recension enriches the mathematical content of the treatise, whereas Maghribī's recension includes some superfluous and superficial changes and lacks the mathematical force of Ṭūsī's recension.

**Keywords:** Muḥyeddīn Maghribī, Naṣīr al-Dīn Ṭūsī, spherical geometry, *Tahrīr Ukar*, Theodosius

#### **Spherical Interpretation of Plane Geometry in Menelaus of Alexandria's *Sphaerica***

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Menelaus' *Sphaerica* can be considered as the most important classical text in the tradition of spherics books, written with the aim of the solution of problems arising in spherical astronomy. Euclid's *Elements* is the most important book on plane geometry. This article aims at a comparative study of Menelaus' *Sphaerica* and Euclid's *Elements*, to show that Book I of *Sphaerica* is an attempt to reconstruct Book I of

the Elements for the case of spherical figures. We mention Menelaus' achievements as well as the limits of his project. The topic of the congruent triangles is treated with special reference to the differences which exist between the plane and the spherical cases. We also show that the spherical counterpart of Euclid's important theorem on the sum of the interior angles of a triangle (Euclid, I/32) has been put forward, for the first part, by Naṣīr al-Dīn al-Ṭūsī in his *Recension of Menelaus's Sphaerica*.

**Keywords:** Euclid's *Elements*, Menelaus of Alexandria, Naṣīr al-Dīn al-Ṭūsī, Plane Geometry, *Sphaerica*, Spherical geometry

### **Dār al-Funūn and its Role in Modern Military Training in Nāṣirī Period in Iran**

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Dār al-Funūn is the first center for systematic modern science education and new military training in Iran. As far as the military disciplines are concerned, theoretical and practical training of the students, as well as troops and officers, authoring and translating books on military disciplines, regular examinations and upbringing a generation of students in new military tactics are the most important achievements of this school. The pinnacle of success and effectiveness of Dārulfunūn was the first few years after its establishment (1268-1276 AH) and then the school entered a period of decline. In this paper, we try to study on the new military training in Dārulfunūn in Nāṣir al-Dīn Shāh's era (Nāṣirī era): the methods of teaching, the teachers, educational programs, students, authors and translators of military books are the most important issues discussed in this study.

**Keywords:** Dārulfunūn, Nāṣir al-Dīn Shāh, Artillery, Infantry, Cavalry

## **The place of Rāzī's *Treatise on Substitute Drugs* in the Pharmacological and Pharmaceutical Tradition of the Islamic Period**

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The interest of physicians and pharmacists in the substitution of simple drugs by other drugs goes back at least to the first century A.D., where some dispersed references to this subject are found in the *Materia medica* of Dioscorides (*fl.* 50-70). Nevertheless, the oldest coherent list of this kind of substitutes is given as the 25<sup>th</sup> chapter of the 7<sup>th</sup> Book of *Medical Compendium* by Paul of Aegina, written toward the middle of the 7<sup>th</sup> century A.D. on the basis of Galen's doctrines. The physicians of the Islamic period seem to have paid more attention to this subject and produced monographs on it. In this paper, we show that among these works, an Arabic version of a treatise attributed to an otherwise unknown pharmacist named BDIGHURS, as well as *The treatise on Substitute Drugs* by Rāzī have exercised the greatest influence on the works written on this subject till the 18<sup>th</sup> century A.D. and that Rāzī's treatise is greatly influenced by the work of BDIGHURS.

**Keywords:** Islamic physicians, "the six necessary causes", sports

### ***Shikārnāme*-ye *Malikshāhī* and its importance in Historiography of Science**

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*Shikārnāme*-ye *Malikshāhī* (*The Malikshāhī Book of Hunting*) which is also known as *Shikārnāme*-ye *Khusrawī*, is a book prepared in the 5<sup>th</sup> AH/11<sup>th</sup> AD century by Malikshāh's order and Nizām al-Mulk's patronage. The book's actual redaction is due to abū al-Ḥassan Niyshābūrī. This book refers to many other books on Falconry and Hunting (*Bāznāme* and *Shikārnāme*) especially the translation of the "Shikārnāme-ye Anūshirawānī". It includes an introduction on the

history of the writings about hunting in Iran till the 5<sup>th</sup> century and two part about training and treatment of birds of prey and other hunting animals. Unfortunately, due to some mistakes in manuscripts catalogues, this work, which is one of the most important scientific texts of the Seljuk period, remains unpublished. In this paper, we make a survey of different aspects of this work and introduce three manuscripts which exist in Iranian libraries.

**Keywords:** Abū al-Ḥassan Niyshābūrī, *Shikārnāmi Malikshāhī*

**The Theologian and the Mathematician:  
Fakhr al-Dīn al-Rāzī and the Geometrical Works of  
Ibn al-Haytham**

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Fakhr al-Dīn al-Rāzī, theologian and philosopher of the 12<sup>th</sup> century (1148-1209), has a huge literary production in many scholarly disciplines of his time. Notwithstanding some original ideas which are mostly found in his theological and philosophical writings, most of his other works are compilations based on other sources. Some of these sources still exist, while most of the others seem to have been lost forever. Research on the relation between al-Rāzī and his sources can explicate the way he chose his sources and the degree in which he transformed them. In this paper some of the mathematical themes borrowed by al-Rāzī from the works of Ibn al-Haytham, the great mathematician and physicist of the 10<sup>th</sup> – 11<sup>th</sup> century, are analysed and the way he has changed and adapted them to his purposes is discussed. This research can shed a light on the intellectual relations between different types of researchers – theologians, philosophers, and scientists of this important period in the intellectual history of the Islamic civilization. It can also show how the work of Ibn al-Haytham was received in the cultural domain of Iran almost one and a half century after his death.

**Keywords:** Fakhr al-Dīn al-Rāzī, Ibn al-Haytham, geometry, *Jāmi' al-ʿulūm* (*Compendium of the Sciences*), *Sharḥ Muṣādarāt Uqlīdis* (*Commentary on the premises of Euclid's Elements*), *Ḥall Shukūk Kitāb Uqlīdis fī al-ʿUṣūl wa Sharḥ Maʿānīh* (*On the Resolution of Doubts in Euclid's Elements and interpretation of its Special Meanings*)