
THE CONTRIBUTION OF ACADEMICIAN VICTOR HAMBARTSUMYAN TO THE HISTORY OF ARMENIAN AND WORLD COSMOLOGICAL THOUGHT AND ASTRONOMY



In the Armenian Highland the observation of the heaven and celestial bodies has taken place since primordial times. The stony observatories of Zorats-kar and Metsamor, as well as petroglyphs (the 6th – 3rd millennia B.C.) testify to ancient Armenian astronomical ideas. The names of Anania Shirakatsi (610-685) in the Middle Ages and Victor Hambartsumyan (1908-1996) in modern times sparkle in the arena of cosmology and astronomy¹.

The history of cosmology reveals the continuity of fundamental ideas concerning the problems of the Universe. Scientists of different epochs contributed greatly to the understanding of the fundamental laws of the universe. However the evolutionary path of scientific development has not been smooth. Clashes of diverse theories in the process of the replacement of old conceptions by new ones accompanied the general tendency of the progress of scientific thought directed to

the knowledge of nature. Academician Victor Hambartsumyan noted: “Nature, really, is much more profound and complex than any of our preconceived notions about it. Precisely, on account of its existence regardless of consciousness, our science about nature, although it seems perfect, is, as a matter of fact, only an approximate reflection, moreover, it is a reflection of some limited sphere one way or another of researched phenomena”².

In the 20th century even Big Bang theory was described as belonging to the category of mythology. The main contradictions in this field arise from the problem of where energy comes from? Because, despite the fact that “there are good reasons to believe that supernova represents a release of nuclear energy,” nevertheless, “this is obviously insufficient to account for the
Hambartsumyan

¹ Danielyan E. L. *From Shirakatsi to Hambartsumyan. Armenian Mind*, vol. II, N 2, 1998, pp. 280-286.

² Hambartsumyan V. *Philosophical Questions of the Science about the Universe*, Erevan, 1973 (in Russian).

explosions and the QSO's (Quasi-Stellar Object)", according to the new theory of "matter-antimatter symmetry"³.

The observations of the Milky Way acquired importance in the history of astronomy in Armenia. The great Armenian geographer, mathematician, astronomer, natural-philosopher Anania Shirakatsi, touching the problem of the Milky Way and celestial bodies, applied the data of ancient science. Anania Shirakatsi brought a kind of judgment which corresponded to an opinion expressed by Anaxagoras (500-428 B.C.) and the great atomist, Democritus (460-371 B.C.) who is considered to be the founder of the idea of the Milky Way's nature: "Some philosophers said of the Milky Way that it is a great number of gathered stars – faint and bright. Their light is perceived equally because of vague visibility"⁴.

In the course of about two and half millennia the problem of the Milky Way has greatly interested many generations of astronomers. The 20th century witnessed the most important stage of this research. Together with the discovery of strong activity in the centre of the galaxy it became obvious that the whole galaxy has been in the process of expanding outward. In the 1930s Hambartsumyan elaborated a fundamental theory of cosmogonic conception on the basis of the discovery of matter's ejection from stars. This phenomenon had a very important evolutionary meaning, because it helped us to understand that as a result of the ejection of matter the diminution of the star mass is higher than in the case of radiation⁵. The discoveries by V. Hambartsumyan in the field of stellar astronomy prompted a new interpretation of the huge amount of material concerning the physics of stars and stellar statistics in astrophysics⁶.

Deepening the idea of the continuity of the processes of star formation, V. Hambartsumyan discovered "stellar associations"⁷: "The discovery of stellar associations brought V.A. Hambartsumyan to an assertion, which later became generally accepted, that there are young and very young stars along with old stars and that star formation in the galaxy has been a long process and continues till our times"⁸.

The discovery of *stellar associations* is connected with the name of Victor Hambartsumyan in the world of astrophysics. It is noted: "A stellar association

³ **Alfven H.** *How should We Approach Cosmology? "The Questions of Physics and Evolution of the Universe,"* E., 1978, pp. 9, 23.

⁴ **Anania Shirakatsi,** *Cosmography and Calendar,* E., 1940, pp. 37-38 (in Armenian).

⁵ **Hambartsumyan V.** *The Questions of Cosmogony in the Light of Contemporary Astronomy.* "Natu-re", N 2, 1939, pp. 23-26 (in Russian).

⁶ **Hambartsumyan V.** *To the Statistics of Double Stars.* "Astronomical Magazine", N 14, 1937, **Hambartsumyan V.** *Cosmogony and Modern Astrophysics.* "Scientific Proceedings LSU", N 17, 1937, pp. 92-102, **Hambartsumyan V.** *Scientific Works in Two Volumes, vol. I,* E., 1960, pp. 142-157 (all in Russian).

⁷ **Hambartsumyan V.** *Evolution of Stars and Astrophysics,* E., 1947, pp. 12-16.

⁸ **Aghekyan T. A.** *Stars, Galaxies, Metagalaxy,* M., 1970, p. 64.

is a very loose *star cluster*, looser than both *open clusters* and *globular clusters*. Stellar associations will normally contain from 10 to 100 or more stars. The stars share a common origin, but have become gravitationally unbound and are still moving together through space. Associations are primarily identified by their common movement vectors and ages... Stellar associations were first discovered by the *Armenian* astronomer **Viktor Hambartsumyan** in 1947”⁹.

One of many other outstanding discoveries belonging to Hambartsumyan is the idea of the formation of new galaxies and spiral arms “owing to the matter contained in the nuclei of galaxies. These nuclei have small sizes and high density. In so far as such processes of star formation can not take place owing to the common type stellar population contained in the nuclei of galaxies, we must accept that nuclei may contain considerable masses of proto-star matter”¹⁰. This discovery found its proof in the works of other astrophysicists. C.Lynds and A.Sandge discovered a huge ejection as a result of the mighty explosion which occurred 1,5 million years ago in the nucleus of the galaxy M 82. It is proved also by such discoveries as explosions in other galaxies together with ejections¹¹, as well as Quasi-stellar radio sources - .quasars¹². It was also suggested that “a compact object with the mass of several billions of the mass of the sun, which was discovered recently by American astrophysicists in the central part of the galaxy M87 (radio galaxy Virgo A), was not a black hole, but a representative of that kind of super-dense body which was divined in Byurakan”¹³.

The conclusion of V. Hambartsumyan about the origin of cosmic objects in the process of research of the fragmentation of dense and super-dense matter on different levels of the structural hierarchy of the universe is a fundamental thesis of non-classical direction in astrophysics. One of the presumptions of this direction is concluded in the following idea: “The Universe is infinitely varied and inexhaustible on the level of phenomena as well as on the level of laws”¹⁴. Following on from the works of Academician Hambartsumyan and the adherents of the non-classical direction in astrophysics, the explanation of non-stationary phenomena in the universe must be based principally on new laws of physics. As Vorontsov-Velyaminov noted, “Hambartsumyan is right in the main thing: he pointed to the great significance of non-stationary processes in the

⁹ http://en.wikipedia.org/wiki/Stellar_association.

¹⁰ **Hambartsumyan V.** *La structure et l'évolution de l'univers*, Editions Stoops, Bruxelles, 1958, p. 241.

¹¹ “*The Problems of Modern Cosmogony*”, Edited by Academician V. Hambartsumyan. M., 1972, p. 19 (in Russian).

¹² **Mirzoyan L.** *Observation Approach to the Evolution of Stars and Galaxies*. “*The Questions of Physics and Evolution of the Universe*”, pp. 197-208 (in Russian).

¹³ **Hambartsumyan V., Kazyutinski V.** *Scientific Revolutions and Progress of Astrophysics*. “*Astronomy, Methodology, Weltanschauung*”, Moscow, 1979, p. 42 (in Russian).

¹⁴ *Ibid.*, p. 24.

Universe and that their energetic scale is larger than may be explained from the point of view of modern physics”¹⁵.

Assessing Academician Hambartsumyan’s contribution to the sphere of cosmology H.Arpa wrote: “Several authors beginning with Hambartsumyan have argued that it is actually an ejection process which causes spiral arms in spiral galaxies... It is the ejection of quasars which causes spiral structure in galaxies... Because of the observed nature of the ejecting quasars...we have the possibility of observing successive, smaller beginnings of the Universe and a subsequent unfolding of different components of the Universe in a manner very similar to that divined by Hambartsumyan more than 20 years ago”¹⁶.

The road of observation and study of the Milky Way and other galaxies – the fundamental kernel of the development of astronomy – has led the human mind to metagalaxy, the cognition of the infinite capabilities of matter, that is to say, from the studies of the original elements constituting the world and the Earth and other spherical cosmic bodies in the universe to the heliocentric system of Copernicus, from the ideas of Democritus about the multitude of worlds and the character of the Milky Way to the discovery of non-stationary processes in the universe owing to the activity of the nuclei of galaxies, according to the cosmogonic conception of Academician Hambartsumyan.

From the point of view of the history of the development of cosmology, the astrophysical theories of world-famous Victor Hambartsumyan through the deepening of specialized principles of natural science greatly contribute to the determining of new theories conditioned by a philosophical interpretation of cosmogonic conception.

DANIELYAN E. L.
Doctor of Historical Sciences

¹⁵ Vorontsov-Velyaminov B. A. *Some Methodological Questions of Astrophysics* – “Astronomy, Methodology, Weltanschauung”, p. 91.

¹⁶ Arpa H. *Ejection from Galaxies and Galaxy Formation*. – “The Questions of Physics and Evolution of the Universe”, pp. 69, 78-79.