N E W S
OF THE NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF KAZAKHSTAN
SERIES OF SOCIAL AND HUMAN SCIENCES
ISSN 2224-5294
Volume 2, Number 318 (2018), 103 – 108

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G.A TIKHOV IS THE FOUNDER OF ASTROBOTANY

Abstract. The President of the Republic of Kazakhstan N.A. Nazarbayev has defined an entry into a 30 of the most developed states of the world as a priority strategic objective of the state. Achievement of a goal among other assumes also the expansion of the taken positions in the world market of space services. In this regard need of carrying out a multidimensional research of history of development of space activity in the territory of our state, both during the Soviet period, and since finding of independence by Kazakhstan is represented axiomatic. Knowledge created, thus, will allow to estimate adequately value of astronautics in the history of Kazakhstan and directly a role of Kazakhstan in the history of astronautics. In this article, in the context of detection of the contents of the Kazakhstan contribution to development of astronautics historical bases of the advanced character of the Kazakhstan scientific thought as important factor of complex activity of the Soviet state in development of space technologies reveal. The principles of historicism and an integrated approach of scientific knowledge used in the course of the research have allowed to consider evolution of scientific knowledge of space in their historical development from the moment of origin and up to now in interrelation with various aspects of space activity. The reliability of the presented materials is defined by character of the used sources most of which part is made by funds of the Central archive of the National Academy of Sciences of the Republic of Kazakhstan. In the content of the received results the formation fact in the Academy of Sciences of KAZSSR in the forties of the XX century of the new earlier not existing independent scientific direction – sciences astrobotany which founder was the honored worker of science of the Kazakh SSR Gavriil Adrianovich Tikhov is established. The received results can be used in the context of expansion of knowledge in the field of national history and also for definition of the relevant directions of further historical researches. Historically reasonable fact of important value of the Kazakhstan science for development of world science about space is established.

Key words: astrophysics, astrobotany, G.A. Tikhov.

Introduction

In domestic historiography questions of the Kazakhstan contribution to development of astronautics have received rather narrow aspect of the consideration; that visually appears from results of the carried-out analysis of the existing publications [1 Page 46-48, 2 of Page 92-98]. Meanwhile, this problematics is rather many-sided and perspective from the point of view of carrying out historical researches as it owing to depth of the contents abounds with the historical events and the facts which provide scientific interest in the set allowing to take out her as self-contained and unique category of historical science of Kazakhstan; in a type of the fact that lighting of these pages of the Kazakhstan chronicle can not only promote significant enrichment of national consciousness but also have a positive impact on formation of patriotism of new generation of the Kazakhstan citizens [3 Pages 303-308].

In the context of told, as a objective of this research is carried out the studying of a role of the Kazakhstan science in development of astronautics, in a type of the fact that consideration of this problematics allows to elicit the unique historic facts, clearly showing that results of research activity of domestic scientists during the Soviet period, having determined by itself the advanced character of the Kazakhstan scientific thought, have allowed not only to solve many technical problems arising in the course of development of the space equipment acts but also to head absolutely new earlier not existing scientific directions under the auspices of Academy of Sciences of KazSSR.

Methods

During conduction of the research, the principles of historicism and an integrated approach of scientific knowledge were fundamental. In the set, they have allowed to consider an object of research in a

retrospective of his formation and in interrelation with various aspects of the appearance. At the same time, also concrete historical methods of scientific knowledge have found the application; namely historical and genetic and ideographic methods. Thus, it was succeeded to show historical occurrence and a human factor – the value of the personality in the development of scientific knowledge.

Results

The Kazakhstan scientific thought represents the whole pleiad of bright uncommon talented scientists. In this row a specific place is held by Gavriil Adrianovich Tikhov's personality – astrobotany, the corresponding member of the Academy of Sciences of the USSR, the academician of the Academy of Sciences of KazSSR, the honored statesman of science of the KazSSR; laureate of the Orders of Lenin and Labour Red flag, medal «For valiant labor in the Great Patriotic war of 1941 – 1945» [4].

The native of Smolevichi of the Belarusian SSR (1875) Gavriil Adrianovich has devoted all the course of his life to professional studying of astronomy. He has graduated from physical and mathematical faculty of the Moscow university on the speciality of astronomy (in 1897); successfully protected the degree of the master of astronomy (in 1913); a scientific degree of the doctor of astronomy (in 1934); professor of astronomy is awarded an academic status (in 1949). In different years he worked in various profile institutions, including Astrophysical observatory in Medona (near Paris), Pulkovo Observatory for about forty years, and Academy of Sciences of the Kazakh SSR – from 1941 to his last days. Since 1947 he had headed the Sector of astrobotany organized by him. Merits of the scientist are recognized by both domestic, and foreign scientific community that among other predetermines value of the available archival materials transferred after Gavriil Adrianovich Tikhov's death on January 25, 1960 by the Sector of astrobotany and his foster daughter Anna Gavriilovna on continuous storage to the Central archive of National academy of sciences of the Republic of Kazakhstan. The personal archival fund of the academician of the Academy of sciences KazSSR was made by the unique documents systematized according to seven sections [5]:

- biographic materials;
- G.A. Tikhov's works and materials to them;
- materials of public, pedagogical and scientific activity;
- correspondence;
- photoillustrations;
- materials about Tikhov G.A.;
- materials of other persons.

About two hundred scientific works belong to G.A. Tikhov, among which scientific articles about possibility of life on other planets of solar system [6], results of observations of Mars, Saturn [7], the Moon [8], a technique of astronomical observations [9], brightness and blueness of the sky [10] and others. Being a militarian, the corporal Tikhov has offered a number of new ways of observation on the basis of use of opportunities of the light filters allowing to improve visibility of underwater objects and constructions when holding actions of visual air reconnaissance [11]. Besides, the scientist was interested in the effect of self-emission of plants [12 Pages 3-7], adaptability of flora to various extreme living conditions [13 Pages 673-676], a variety of manifestation of life and a possibility of her existence outside of the Earth [14 Pages 145-152].

Thus, it is noted that the materials of personal archive of Gavriil Adrianovich Tikhov presented in the Central archive of the National Academy of Sciences of the Republic of Kazakhstan allow to thoroughly investigate the public, pedagogical and research activity of the scientist and, thus, to reveal prerequisites and conditions of formation of new branch of scientific knowledge of space.

The fact, that the G.A. Tikhov's ideas about the development of the independent directions of astronomy and astrophysics originated from results of the observations made by him in 1909 in Pulkovo Observatory by the 30-inch refractor [15] and also in 1918 and 1920 by the 15-inch refractor [16 Pages 5-6], is undoubted.

However, as it testifies from Gavriil Adrianovich's memoirs, the repeated analysis of the data obtained earlier, which is carried out in 1945 in Alma-Ata, became for the scientist the starting point for carrying out in 1946 in mountains of Zailiysky Alatau of new researches; as a result of which the new division of the Academy of Sciences of KazSSR – «The sector of astrobotany» has received its official existence on November 11, 1947. In a consequence (in 1948-1951) under the leadership of G.A. Tikhov expeditions on

studying of optical properties of plants in the subarctic region (the area of the ostium of the Ob River), in the desert of the Central Tien Shan, in the mountains of Kyrgyzstan, on coast of Issyk Kul, the area of the Lake Chatyr-Kul, on Pamir and the Southern Kazakhstan were organized; by results of which analysis together with astronomical observations of the planet Mars (during oppositions 1948, 1950 and 1952) the rich scientific material has been accumulated; among other things, this work allowed to formulate the main postulates of astrobotany as a science [17]:

1. Laws of life in the Universe are uniform in essence, but are various in a form and manifestation;
2. The adaptability of life to conditions of the environment is extremely high;
3. Plants have the optical adaptability to environment conditions.

Thus, analyzing the available archival materials it is possible to state with confidence the fact that the astrobotany as directly new science has originated in 1945 in the city of Alma-Ata of the Kazakh SSR [18 Pages 36].

During the research activity G.A. Tikhov has developed a number of techniques [19 Pages 526-528] and also special devices for execution of observations among which by its originality marks out designed by him sapphire cyanometer – the device intended for the determination of optical properties of the sky. So, by means of its usage the scientist drew a conclusion about the uniqueness of atmospheric conditions for production of astronomical observations in certain areas of the Southern Kazakhstan. In his reports, Gavriil Adrianovich, in particular, notes the following words: *«Observations were made by me in August, 1943 in Achisay (Ak-Dzhar) ... Already the first proximate impression of the clear sky in Achisay and in Baydzhansay was absolutely exclusive. Such clear sky, with such depth of a sapphireness I saw very seldom, only on the high mountains. Besides the sky in both places struck with the stability of its purity ... I have never observed such a clear sapphire sky near the Sun anywhere»* [20].

In this way it is necessary to notice that in the observations G. Tikhov focused a great attention to the formulation of color of the sky and, in accordance, he searched the definitions which optimally characterize it, that has found the reflection in a number of the works which are carried out by him: *«As a result of the research I consider that the comparison of color of the sky with color of sapphire used in the Bible is extremely successful. We will be much closer to the truth calling the sky not blue, but sapphire»* [21].

Under the auspices of the created Sector of astrobotany the activity on a search of the optimum place for deployment in the territory of Kazakhstan of observatory [22 Pages 2] has been sped up. For searching of the best places for placement of the astronomical tools in 1950-1952 G. A. Tikhov have been initiated three expeditions in 11 places of Kazakhstan and Uzbekistan, an research object of which was assessment of quality of astronomical images, therefore the images received in the area around Turkestan [23] have been recognized as the best.

At the same time on consideration of optical characteristics of suitability of the area for carrying out observations of celestial bodies – the Kazakhstan territory has been recognized by the scientist as the best in comparison with the being available analogs of the foreign states. Thus, G. Tikhov noted: *«The Kazakh republic at the its extensive territory has the numerous places suitable for the specified purpose (a comment of the author: organizations of astrophysical observatory). On Ridge Karatau around Achisay and Baydzhansay the transparency of the atmosphere and blueness of the sky are considerably surpass the best areas of Europe and America»* [24 Pages 9]. In this way, it is necessary to notice that quite possibly the mentioned physiographic conditions haven't lost the relevance to this day owing to what they can be used as well in nowadays.

Nevertheless, the necessity of the developed infrastructure, availability and proximity of locations of scientific and educational institutions and a combination of a number of additional factors (such as, providing with electricity, water, a condition of the soil, a platform relief, the presence of suspensions in the air, etc.) have defined the choice of the location of present astrophysical laboratory near the city of Almaty [25 Pages 15-19].

Thus, the fact that research activity of Gavriil Adrianovich Tikhov had a great importance for development directly Kazakhstan and in general the Soviet science is established, moreover received by him results and the formulated conclusions have brought a notable contribution to many-sided process of expansion of scientific knowledge of space, having allowed to distinguish as the independent scientific direction new science – astrobotany. All the professionalism, all himself G. Tikhov has devoted to studying

of astronomy, formulating: *«The main objective of the sector of astrobotany is the research of a possibility of life on other planets of solar system, except Earth»* [26].

However seeking life traces among stars, he organized and made a large number of surveys in various corners of Earth; relying on works of K.A. Timiryazev, S.N. Vinogradsky, P. Bekkerel and other scientists, comparing the elicited facts and drawing logical parallels, he have substantiated and alleged a possibility of existence of life forms on Mars and Venus, supposed existence of microorganisms on giant planets of solar system Jupiter, Saturn, Uranium and the Neptune. Undoubtedly, the scientist allowed probability of differences in manifestation of organic organisms on other planets, at the same time with a confidence claiming that *«... life is incomparably more flexible, than all lucky coincidences ... life is the natural phenomenon, which is happening with iron necessity as a result of evolution of substance»* [27].

After the death of the scientist the activity of the scientific direction developed by him has weakened, a part of materials has been transferred to archive, the Sector of astrobotany has been abolished, however, the significance of results received under his management have its recognition in wide circles of scientific community to this day, visually testifying the contribution of the Kazakhstan scientific thought to development of the specific direction of science.

Summary, discussion, conclusions

In the context of the previously mentioned, following states are argued:

1. Astrobotany as the separate scientific direction has originated and got its development in the 40-50th years of the XX century in scientific community of the Academy of Sciences of KazSSR;

2. The founder and the main driving force of astrobotany as sciences, the doctor of astronomy, professor, the corresponding member of the Academy of Sciences of the USSR, the academician of the Academy of Sciences KazSSR, the honored statesman of science KazSSR Gavriil Adrianovich Tikhov appeared;

3. The relevance of results of the scientific research received under the auspices of G.A. Tikhov is characterized by three aspects:

- the uniqueness of the Kazakhstan territory from the point of view of carrying out optical observations of celestial bodies is by practical consideration proved and optimum sites of the area for placement of astronomical tools are substantiated;
- the extensive material characterizing special properties of flora, among other growing in the territory of Kazakhstan, is received;
- the conception of astrobotany is created and evidence-based theories of a possibility of the existence of life on other planets are formulated.

It is quite probable that led by necessity to expansion of an area of the existence, the mankind in the near future will face the need of the practical solution of questions of colonization of territories of new planets owing to what the problems of astrobotany formulated by G.A. Tikhov will find the direct relevance, and therefore the perspectivity of this scientific direction can't lose the novelty.

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Г.А ТИХОВ - АСТРОБОТАНИКАНЫҢ НЕГІЗІН ҚАЛАУШЫ

Аннотация. Қазақстан Республикасының Президенті Н.Ә. Назарбаев әлемдегі ең дамыған 30 мемлекеттің стратегиялық мақсаттарына кіру басым ретінде айқындады. Алға қойған мақсатқа жету үшін басқалардың қатарында ғарыштық қызметің әлемдік нарықта алып жатқан позицияларын кеңейтуді көздейді. Осыған байланысты, кеңестік кезеңде, сондай-ақ Қазақстан тәуелсіздікке ие болғаннан бері, еліміздің аумағында ғарыштық қызметтін тарихын дамытудың көпаспектілі зерттеу жүргізу қажеттігі аксиомалық болғанын ұсынылады. Осылайша қалыптастырылған білім, Қазақстан тарихында ғарыштын мәні, және ғарыш тарихында тікелей Қазақстанның рөлін дұрыс бағалауға мүмкіндік береді. Бұл мақалада, ғарышкерлікті дамытуда қазақстандық үлесінің мазмұнын анықтау контексінде, қазақстандық ғылыми озық ойлар сипаты, ғарыштық технологияларды дамыту үдерісіне кеңес мемлекетінің кешенді қызметінің маңызды факторы ретінде тарихи негіздері ашылады. Зерттеу үдерісінде пайдаланылған тарихаят және кешенді тәсіл принциптері ғарыш туралы ғылыми білім тану сәттен бастап біздің күнге дейін ғарыш қызметін әртүрлі аспектілерін өзара байланыстыра отырып, эволюциясын қарауға мүмкіндік берді. Ұсынылған материалдардың дұрыстығы пайдаланылған дереккөздер сипатымен анықталады, онын басым бөлігін Қазақстан Республикасы Ұлттық ғылым академиясының Орталық мұрағатының қорлары құрайды. Алынған нәтижелердін мазмұнында XX ғасырдың 40-шы жылдары ҚазКСР Ғылым академиясында жаңа, бұрын болмаған дербес ғылыми бағыттың – астроботаника ғылымының қалыптастыру фактісін бекітеді, оның негізін қалаушы Қазақ КСР

Ғылым еңбек сіңірген қайраткері Тихов Гавриил Адрианович көрсетіп келді. Алынған нәтижелер, отандық тарих саласындағы білімдерін кеңейту контексінде, сондай-ақ одан әрі тарихи зерттеулердің өзекті бағыттарын анықтау үшін пайдаланылуы мүмкін. Әлемдік ғарыш туралы ғылымды дамыту үшін Қазақстандық ғылымның маңызы бар тарихи дәлелденген фактісін көрсетіп негізделген.

Түйін сөздер: астрофизика, астроботаника, Г.А. Тихов.

УДК 929, МРНТИ 03.20

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Г.А ТИХОВ – ОСНОВОПОЛОЖНИК АСТРОБОТАНИКИ

Аннотация. Президент Республики Казахстан Н.А. Назарбаев в качестве приоритетной стратегической цели государства определил вхождение в 30-ку самых развитых государств мира. Достижение поставленной цели в числе прочего предполагает и расширение занимаемых позиций на мировом рынке космических услуг. В этой связи представляется аксиоматичной необходимость проведения многоаспектного исследования истории развития космической деятельности на территории нашего государства, как в советский период, так и со времени обретения Казахстаном независимости. Сформированные, таким образом, знания позволят адекватно оценить значение космонавтики в истории Казахстана и непосредственно роль Казахстана в истории космонавтики. В данной статье, в контексте выявления содержания казахстанского вклада в развитие космонавтики раскрываются исторические основы передового характера казахстанской научной мысли, как немаловажного фактора комплексной деятельности советского государства в процессе развития космических технологий. Использованные в процессе исследования принципы историзма и комплексного подхода научного познания позволили рассмотреть эволюцию научных знаний о космосе в их историческом развитии с момента зарождения и до наших дней во взаимосвязи с различными аспектами космической деятельности. Достоверность представленных материалов определяется характером использованных источников, большую часть которых составляют фонды Центрального архива Национальной академии наук Республики Казахстан. В содержании полученных результатов констатируется факт формирования в Академии наук КазССР в 40-х годах XX века нового ранее несуществовавшего самостоятельного научного направления – науки астроботаника, основоположником которой явился заслуженный деятель науки Казахской ССР Гавриил Адрианович Тихов. Полученные результаты могут быть использованы в контексте расширения знаний в области отечественной истории, а также для определения актуальных направлений дальнейших исторических исследований. Констатируется исторически обоснованный факт немаловажного значения казахстанской науки для развития мировой науки о космосе.

Ключевые слова: астрофизика, астроботаника, Г.А. Тихов.

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