N. P. STEPANYAN

ON CENTERS OF ORIGIN OF CULTIVATED PLANTS: CASE STUDY OF ARMENIAN HIGHLAND

The theses of Vavilov's theory on centers of origin of cultivated plants are considered in relation to the Armenian Highland. Arguments in favor of antecedence of originating of agriculture in mountainous areas are set forth. The widespread concepts of predominance of the "Fertile Crescent" area in domestication of plants and emergence of agriculture are criticized. Various factors (botanical, arche-, ethno-botanical) proving the antiquity of crop farming in the territory of Armenian Highland are discussed.

Armenian Highland, centers of domestication, "Fertile crescent"

Սփեփանյան Ն. Պ. Մշակաբույսերի առաջացման կենտրոնների շուրջ (Հայկական լեռնաշխարհի օրինակով): Հայկական լեռնաշխարհի կտրվածքով դիտարկվում են Ն. Ի. Վավիլովի տեսության դրոյթները: Բերվում են փաստարկներ, որոնք վկայում են լեռնային վայրերում երկրագործության ձեւավորման մասին: Քննադատական վերլուծության է ենթարկվում բույսերի ընտանեացման եւ երկրագործության առաջացման հարցում «Բարեբեր մահիկի» նախապատվելի դերի մասին ներկայումս տարածված տեսությունը: Դիտարկվում են փաստեր (բուսաբանական, հնա-, էթնոբուսաբանական), որոնք վկայում են Հայկական լեռնաշխարհում երկրագործական մշակոյթի վաղնջանության մասին:

Հայկական լեռնաշխարհ, ընտանեացման կենտրոններ, «Բարեբեր մահիկ»

Степанян Н. П. К вопросу о центрах происхождения культурных растений (на примере Армянского нагорья). Положения теории Н. И. Вавилова о центрах происхождения культурных растений рассматриваются применительно к Армянскому нагорью. Приводятся аргументы в пользу первичности возникновения земледелия в горных районах. Подвергаются критике распространенные в настоящее время представления о преимущественной роли зоны «Благодатного полумесяца» в доместикации растений и зарождении земледелия. Рассматриваются факты (ботанические, археo-, этноботанические), указывающие на древность земледельческой культуры на территории Армянского нагорья.

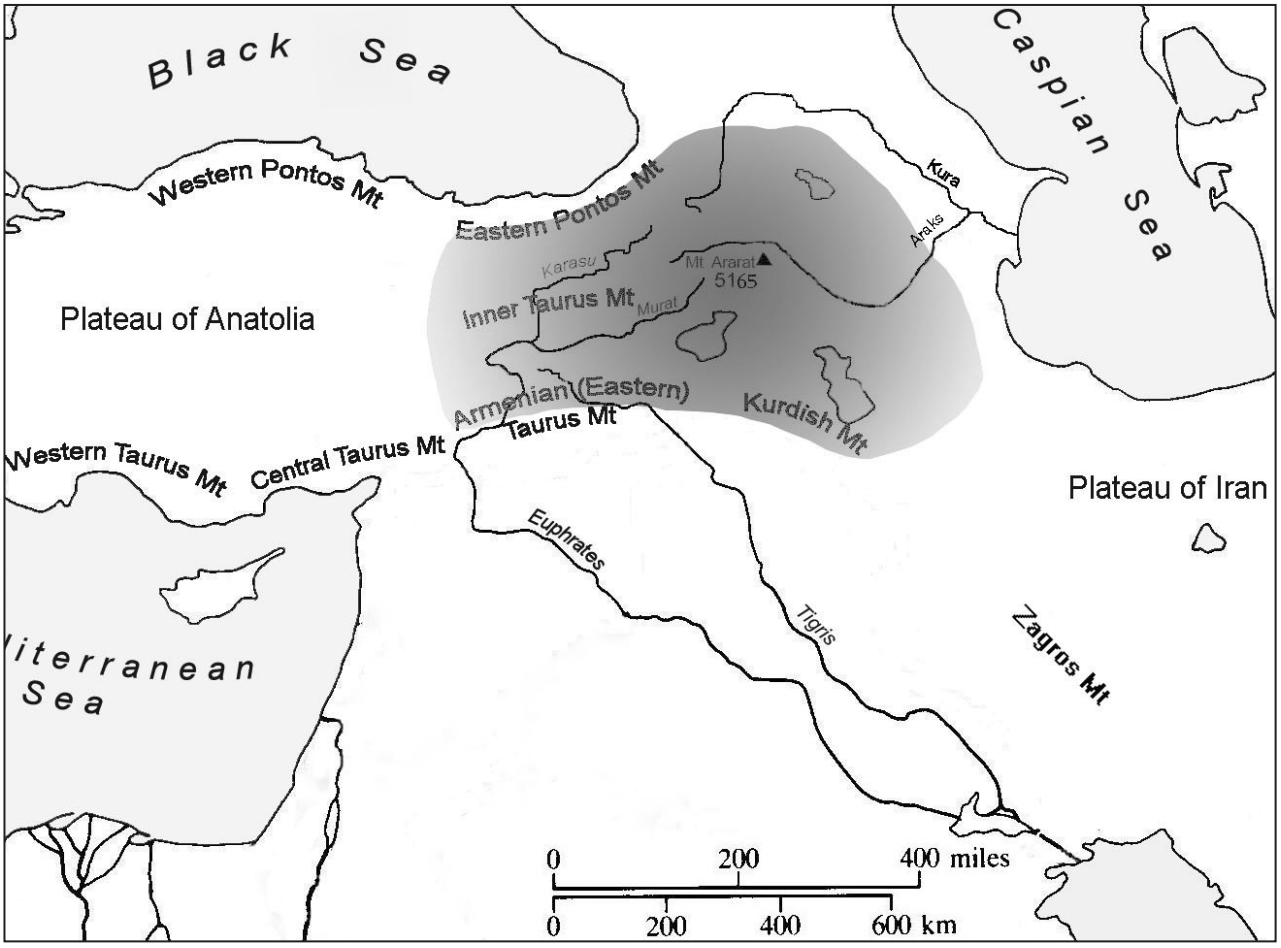
Армянское нагорье, центры доместикации, "Благодатный полумесяц"

Issues related to the introduction of plants in culture, emergence of agriculture and ways of dispersal of cultivated plants have challenged researchers since long ago. Answers to these questions clarify not only the origin and development of agriculture but also of culture as such. Therefore, these problems are in the focus of attention of scholars engaged in different domains of science (botanists, anthropologists, archeologists, ethnographers, linguists, etc.).

Certain information about the origination of cultivated plants was brought up as early as in the works by ancient authors. However, the first detailed studies on the history and geography of cultivated plants appeared quite recently after the publication of A. De Candolle's study: "Origine de plantes cultivees" (1882). Later there were numerous studies devoted to the history of origin of cultivated plants (Комаров, 1931; Жуковский, 1971; Harris, 1996; Harlan, 1997; Damania, 1997, etc.). However, the greatest contribution to the clarification of these problems belongs to N. I. Vavilov and his followers (Sinskaya, Bakhteyev and others). It was Vavilov and specialists of the institute established by him (WIR) who in the 1920s—1930s conducted regular field studies and researches aimed at the identification of wild relatives of cultivated plants and centers of their specific and intra-specific diversity.

A. L. Takhtajan (Тахтаджян, 1978: 26) evaluated the Vavilov's approach as follows: «... The outstanding studies conducted by N. I. Vavilov in geographical centers of origin of cultivated plants have convincingly demonstrated the theoretical and practical significance of the "differentiated botanical-geographical method" developed by Vavilov... It is the direction of studies on which both phytochorionomy and the entire strategy of protection of the flora in all the richness of its genofond must be eventually based».

The studies conducted by Vavilov and adherents of his school revealed striking proofs of distinctly pronounced localization of the form-building process and its affinity to geographically



Map 1. Armenian Highland

extremely confined locations. Vavilov highlighted the following amazing fact: despite millennia passed since the initial domestication of plants and despite migration of the nations "... even for plants ... dispersed over all the continents long ago, the main areas holding the primary potential of species was possible to define with a great accuracy" (Вавилов, 1935a: 296). According to Vavilov (Вавилов, 1926;1929; 1935a, b), the areas where until the present a diversity of wild relatives and cultivars is concentrated are actually the centers of domestication, i.e. locations of the first cultivation of these plants.

Proceeding from the analysis of the vast factual material, Vavilov developed a theory of polytopic origination of crop farming, i.e. of its emergence in many regions of the world. He identified seven main geographical centers of origin of cultivated plants: South Asian, East Asian, Southwest Asian, Mediterranean, East African, Central American and Andean centers (Вавилов, 1940).

Later some adjustments were made by different researchers, however, as J. R. Harlan (1997: 2) notes: "A little bit has been added here and there but the overall conclusions are very similar". Thus, up to the present Vavilov's concepts on genetic centers of cultivated plants haven't lost their relevance.

This article considers the area that constitutes part of the Southwest Asian center of origin of cultivated plants — the Armenian Highland (Map 1). Vavilov (Вавилов, 1935a) called this region an extremely interesting one in the context of domestication and considered it as one of the most important sites of the Southwest Asian center of origin of cultivated plants.

Armenian Highland is a geographical definition implicating the following administrative territories: Armenia, Southwest Georgia (Javakheti), the Nakhijevan Autonomous Republic, Nagorno-Karabakh Republic, East Turkey, Northwest Iran and Northeast Iraq. Armenian Highland is located between Anatolian and Iranian Highlands and differs from them by a greater altitude, vastness of young volcanic covers, better humidification, smaller dimensions and disjunction of inner plateaus. An intense elevation of the Highland took place during the Pliocene and the Quaternary Period, and presently it is a lava-tuff volcanic plateau with a total area at about 400,000 sq km (Ефремов, 1956; 1960; Գաբրիելյան, 2000; Encyclopaedia Britannica, 2011). This area is surrounded by the Pontus Mountains and the mountains of Caucasus Minor in the North and the Armenian Taurus Mountains and Kurdish Mountains in the South. The average altitude of Armenian Highland is 1,500—1,800 m above sea level and the most prominent peak of Highland is the Greater Ararat (5,165 m). There are high-mountain salt-water lakes such as Van (1,700 m above sea level) and Urmia (Rezaye, 1,250 m above sea level) as well as the freshwater lake Sevan (1,916 m above sea level). The biggest rivers of the West Asia have their sources from the Armenian Highland: the Tigris and Euphrates with its tributary the Aratsani (Murat) as well as the Kura River with its tributary the Arax. The Highland has a continental climate and, in general, is characterized by a high degree of diversity.

Armenian Highland meets a number of preconditions specified by Vavilov and his followers for areas where the agricultural civilization originated.

One of the necessary requirements for the initial domestication of plants on the particular territory is a rich

Fig. 1. Some of wild relatives of cultivated plants growing in Armenia: a — *Triticum araraticum*; b — *T. urartu*; c — *Aegilops tauschii*; d — *Hordeum spontaneum*; e — *Lens orientalis*; f — Ficus carica; g — *Punica granatum*; h — *Pyrus caucasica*

phytodiversity. Only in floristically rich regions a long period of gathering prior to farming was possible. As field studies conducted by Vavilov and his collaborators on five continents of the world showed, the most concentrated plant diversity is observed in mountainous regions at an altitude of 500—2,500 m above sea level. The richness of flora in mountainous regions is determined by a number of factors. First of all it is a variety of natural conditions (temperature, precipitates, soils, etc.) which create optimal environment for form-building processes. Another important factor is territorial isolation, presence of numerous niches facilitating the preservation of newly created forms, differentiation of varieties and races. And what is more, mountainous areas are characterized by a higher level of mutation caused by intense ultra-violet radiation, volcanic and seismic activities, etc. The fact that southern mountainous regions were least exposed to glaciers is another key factor contributing to the formation and preservation of phytodiversity. As opposed to many northern lowland areas that were practically "ploughed out" by glaciers during the last geological eras and nowadays have a relatively limited diversity of higher plants, in the southern mountainous regions during the Ice Age foothills served as refugiums of ancient plant species and genera.

All of the above listed factors are typical for the territory of Armenian Highland. Therefore the phytodiversity in Armenian Highland is very high. As it is known, only in the territory of contemporary Armenia occupying a small part of Armenian Highland (around 30,000 sq km) there are more than 3.600 species of plants, 125 of them are endemic. It is worth mentioning that many of these plants are ancestors and wild relatives of the most important cultivars (Гандилян, 1988, 1991; Ghandilyan et al. 2000; Gabrielian, Zohary, 2004; Stepanyan, 2007; Степанян, Назарова, 2009). Among them are big group of cereals (*Triticum, Aegilops, Amblyopyrum, Hordeum, Secale*), grain legumes (*Lens, Cicer, Pisum, Vavilovia, Vicia*), fodder legumes (*Medicago, Onobrychis, Trifolium, Melilotus, Lathyrus*), fruits (*Pyrus, Prunus, Cydonia, Punica, Cerasus, Sorbus, Crataegus, Mespilus, Amygdalus, Malus*, etc.) and vegetables (*Beta, Asparagus, Spinacia, Allium, Lactuca*, etc.) (Fig. 1). In addition, many wild relatives of oil-bearing, spice-aromatic, medicinal as well as of ornamental plants also occur here.

It is important to note that many wild relatives of cultivars are presented in Armenia not only by specific but also by intra-specific diversity. For example, 3 species of wild wheat growing here are represented by more than 100 varieties (Гандилян, 1980).

However phytodiversity is not the only precondition for areas where initial domestication of plants took place. It is known that not all floristically rich regions were hotspots of plant domestication. Introduction of plants into cultivation occurred only in those areas inhabited by man from the earliest times. That is why another essential factor for centers of domestication is the historical one implying cultural aspects and the development of ancient civilization in these areas. This factor is also related to mountain areas for several reasons. Mountain regions and mountainous woodlands in particular contributed to the formation of the first settlements of small groups of people since they "were natural fortresses where the caves provided people with shelters, trees supplied them with materials for their everyday needs and quite often also with fruits fit for food» (Бахтеев, 1960: 13).

A factor of a no less importance for the development of initial crop farming in mountain regions was a relatively easy access to irrigation sources. This assumption articulated by Vavilov, was later developed by E. N. Sinskaya (Синская, 1969) who repeatedly emphasized in her work "Historical Geography of Cultural Flora" that terraced and non-irrigated crop farming in mountain regions and foothills preceded crop farming in large river valleys (such as the valley of the Tigris, Euphrates, Nile, etc.) which required constructing of a complex irrigation system. Sinskaya (Синская, 1969: 82) wrote: «Big rivers and inundated valleys were much more difficult to use compared with small rivers and streams flowing in foothill areas of the bottom and medium-height mountain belts... There are a lot of evidences in favor of the assumption that the first attempts of crop cultivation were made in mountainous areas from where the experience of crop farming spread to neighboring lowland areas».

As to Armenian Highland, terraced agriculture still exists here, and even nowadays mountain rivers and streams are often used for irrigation. Besides, the evidences of ancient cult of mountain springs have been preserved until the present. Prehistoric stone monuments in shape of fish or megaliths with images of fleece and birds — so-called "vishapakars" (dragon-stones) guarding the springs — can be seen at the sources of springs high in the mountains. They are connected with the cult of water and agriculture (Fig. 2). It is highly interesting that the erection of "vishapakars" is a unique phenomenon existing entirely on Armenian Highland (Bobokhyan, 2010).

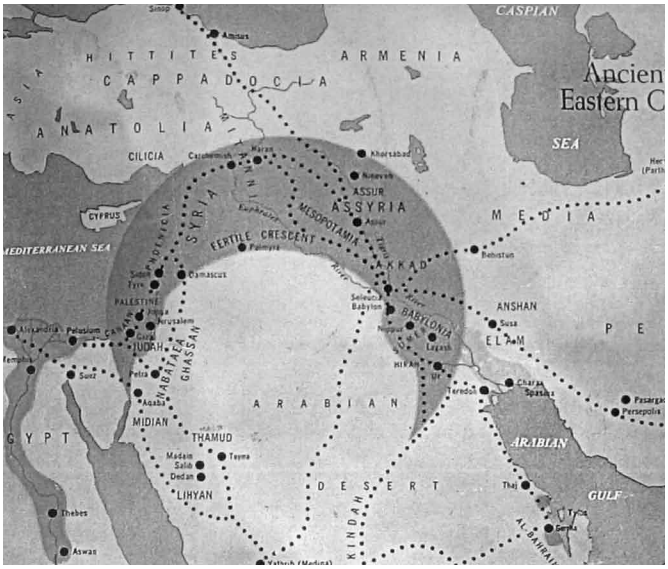
Historical succession of cultures is also considered to be a significant factor for formation of agriculture. Traces of the human settlements on Armenian Highland date back to as early as the Paleolithic age (Сардарян, 1954). To this period belong, in particular, primitive tools made of obsidian whose large deposits are still available in this region. The permanent habitation of Armenian Highland by humans was encouraged by the accessibility of the main raw materials, such as clay, stone, copper and iron ores (as a matter of fact, the latter were absent in Mesopotamia,

Fig. 2. "Vishapakars" (dragon-stones)

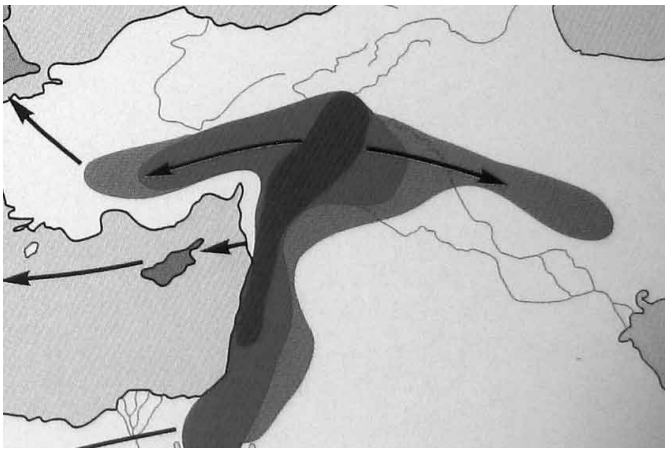
and according to many historical and archeological sources (Авдиев, 1953; Варпа, 1985 etc.) these ores were transported to Sumer and Babylon by the Tigris and Euphrates from northern mountainous regions, that is, if we refer to the map, from the Armenian Highland). There are numerous other indications of ancient and successive evolution of culture, including crop farming culture in the territory of the Armenian Highland. There are, for example, archaeological and ethnobotanical data: cult depictions of plants on ancient historical monuments, survived to date ancient dance and song rituals worshiping farming, use of plants in rituals, etc.

Thus, according to the geographical, botanical and historical data, Armenian Highland is undoubtedly the area where domestication of wild plants was actively evolved.

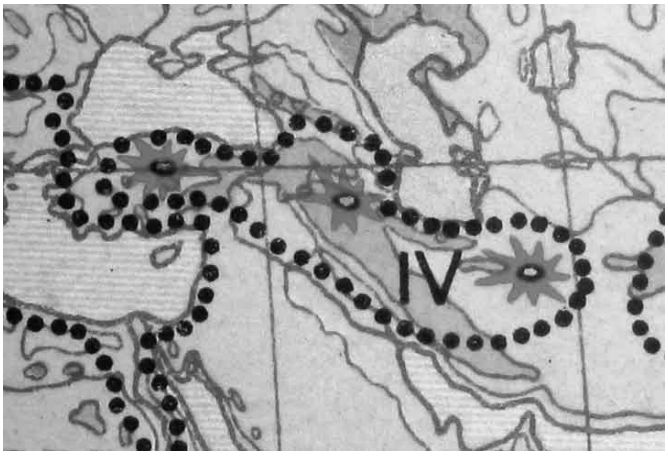
Nevertheless it should be noted that now the role of Armenian Highland (in particular) and mountainous regions (on the



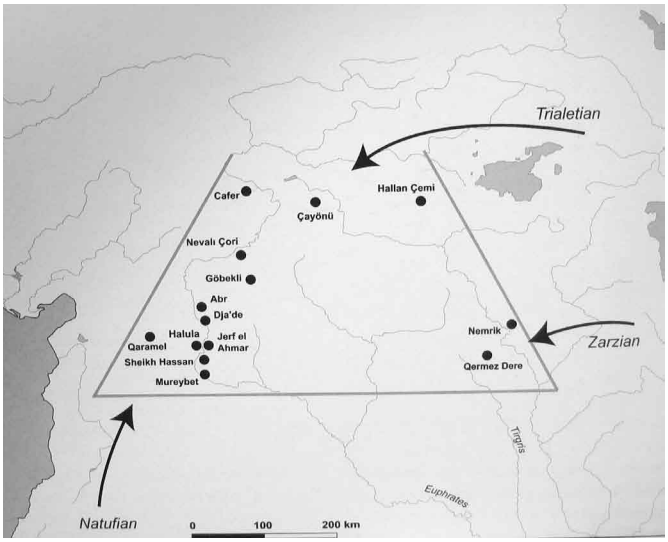
Map 2. «Fertile Crescent» (Thompson, 1977)



Map 3. «Fertile Crescent» (Luening, 2007)



Map 4. Southwest Asian center of origin of cultivated plants (from Vavilov, 1935a)



Map 5. «Gold Triangle» (Aurence, 2007)

whole) in the domestication of plants is often underestimated or neglected. In the 1940 Vavilov was arrested by Stalin regime, his manuscript "History of World Crop Farming " was irreversibly lost and his earlier publications were under a ban for many years. It was only in 1955 that Vavilov's name was rehabilitated (Бахтеев, 1988) and the publication of his survived works, including articles on domestication of plants, began. However, there have been very few republications in English. The monographic publication "At the Dawn of Agriculture" by E.N. Sinskaya, one of the most devoted friends and colleagues of Vavilov who continued his ideas about centers of origin of cultivated plants, appeared in spite of all the difficulties only in 1969, after the death of the author. And still this edition was only in the Russian and had a very small circulation. All this impeded the access of the world scientific community to these concepts of origin of agriculture.

Apparently these circumstances had no small share in bringing along the predominance of another theory: the theory of the "Fertile Crescent" (Map 2). According to this theory, the "Neolithic Revolution", i.e. the transition from hunting and crop collection to farming and animal breeding, took place in the valleys of large rivers (the Tigris, Euphrates, Jordan and the Nile). This hypothesis is based on ideas developed by the linguist and archeologist G. V. Child (Чайльд, 1952) who believed that thousands years ago in the territory of the Fertile Crescent the transition of the mankind from gathering to the farming, from nomadic way of life to the settled one, took place. To a considerable degree the Child's theory determined the attention of scientists to the region of Fertile Crescent up to date. It should be noted that in many contemporary studies the geographical boundaries of the Fertile Crescent vary to a certain extent and are "aligned" to this or that concept (Map 3). Compared with the centers identified by Vavilov (Map 4), the Fertile Crescent is located in a region lying somewhat southwards from the main hotspots of the Southwest Asian center and covers part of the Mediterranean center.

Recently scientists increasingly place a stronger focus on the area located northwards from the Fertile Crescent, so-called "Gold Triangle" (Aurence, 2007). The map shows that the borders of the Triangle area (Map 5) are rather vaguely defined, especially in its upper part. However it approximately spreades over the southeast Anatolia and southwest part of Armenian Highland.

In spite of all the imperfections, the theory of the Fertile Crescent still remains one the most frequently cited ones. For instance, the monograph of D. Zohary and M. Hopf (1994, 2000), widely referred in the context of any issue concerning the origin of crop farming and ancient history, is based on it.

Many of the provisions of the theory of the "Neolithic Revolution" in the territory of the Fertile Crescent raise doubts though. In particular, the transition from gathering to farming could not have been "revolutionary" in the full sense of this word, for it was a very long continuous and gradual process. As far as the irrigation is concerned, the Fertile Crescent theory also brings us to a dead lock, because irrigation works during floods of large rivers require concerted, joint efforts, well-organized work of many people and construction of dams. At the same time the use of water for irrigation purposes in mountainous areas is not so strenuous: gravity water supply from mountain streams can easily be diverted to fields. Persisting that crop farming was first developed in large river valleys and then extended upon foothills is like saying that there was a transi-

tion from a complex irrigation system to a simple one (or from sophisticated irrigation to gravity-based irrigation).

One of the factors which were the reason of focusing of scientists' attention on the Fertile Crescent area is the fact, that as a result of numerous archeological expeditions in this area traces of ancient settlements and kingdoms have been discovered. The foundation of ancient Old World civilizations in large river basins (valleys of the Tigris, Euphrates, Jordan and the Nile) has led to the conclusion that such an important achievement of humankind as domestication of plants has occurred here as well. But we must bear in mind that the emergence of agriculture does not require existence of large towns at all. On the contrary, the presence of well-developed production farming, i.e. crop farming and animal breeding is a necessary precondition for formation of towns and states. Thus the domestication of plants and animals must have taken place long before the foundation of ancient civilizations such as the Sumerian and Egyptian ones. Besides, initial domestication should not necessarily have occurred at sites where later great civilizations of Old World were founded.

It is obvious that domestication of plants is connected with river systems, but rather with its sources, with river heads, and not the valleys and estuaries. That implies that substantial qualitative changes, intensive transformations had taken place in mountainous regions, and at a considerably later stage cultivated plants and agricultural skills transferred to valleys of large rivers, where the development of crop farming moved towards extensification.

Domestication of major cultivars in mountainous regions and long-term development of farming skills made possible further development of agriculture in large river valleys. That was followed by foundation of towns and big state communities. It should be noted that these patterns are typical not only to the Fertile Crescent region but also for all centers of plant domestication: in India, China, America, etc.

Unfortunately, these concepts of the significance and antecedence of crop farming in mountainous regions developed earlier by Vavilov, Stoletova, Sinskaya, Bakhteev and other scientists are now often left out of consideration. Many facts and provisions remain unknown, while others though apparently known are ignored.

One of the reasons is that while extensive archaeological explorations were conducted in the areas adjacent to Armenian Highland, the implementation of such works in the most territory of the Armenian Highland in the recent decades was impossible for certain circumstances. Consequently, these areas are far less understudied.

Nonetheless there have been archaeo-botanical discoveries on the territory of the Armenian Highland testifying the antiquity of the crop farming culture. Even within the small part of the Armenian Highland where it was possible to conduct archeological excavations at least at 50 sites plant remains were discovered. Systematic archaeo-botanical studies were relatively recently initiated in the northeast part of the Armenian Highland (within the present borders of Armenia) and have yielded interesting results. For example, during the explorations conducted by R. Hovsepyan (2004) in vicinity of Aratashen and Aknashen villages remnants of cultivated barley and other plants dating back to VII—VI millennium B.C. were discovered. As many as 25 species of field crops belonging to very early times were found in Armenia, let alone numerous findings of fruit remains (Hovsepyan, 2004; Hovsepyan, Willcox, 2008). Highly promising are the conducting now archaeo-botanical investigations in Godedzor (Hovsepyan, 2010), in the cave complex in the proximity of Areni village, etc.

Apart from discovery of plant remains, comparison of the available archeological data with the contemporary flora as well as the use of the wide range of methods recommended by Vavilov have a big importance in exploring issues of domestication in a particular region (including the territory of the Armenian Highland).

In the conclusion it must be noted that Vavilov's approach apart from its other advantages is very valuable, because the application of his methods allows basing on the current condition of the local flora identifying the regions of initial domestication prior to archaeological excavations. In other words, while archeological data **point to** the areas where certain cultivars grew in ancient times, Vavilov's methods let to **predict** them.

ЛИТЕРАТУРА

Գաբրիելյան Հ. Կ. 2000. Հայկական լեռնաշխարհ. Երեւան. 375 էջ. (Gabrielian H. K. 2000. Armenian Highland. Yerevan. 375 pp. In Arm.)

Авдиев В. И. 1953. История Древнего Востока. Ленинград. 703 с. (Avdiev V. I. 1953. History of the Ancient East. Leningrad. 703 pp. In Russ.)

Бахтеев Ф. Х. 1960. Очерки по истории и географии важнейших культурных растений. Москва. 371 с. (Bakhteev F. Kh. 1960. Studies on history and geography of major cultivated plants. Moscow. 371 pp. In Russ.)

Бахтеев Ф. Х. 1988. Николай Иванович Вавилов. "Наука". Новосибирск. 269 с. (Bakhteev F. Kh. 1988. Nikolai Ivanovich Vavilov. Novosibirsk. 269 pp. In Russ.)

Вавилов Н. И. 1926. Центры происхождения культурных растений // Происхождение и география культурных растений. Ленинград.1987: 33—127. (Vavilov N. I. 1926. Centers of origin of cultivated plants // Origin and geography of cultivated plants. Leningrad. 1987: 33—127. In Russ.)

Вавилов Н. И. 1929. Проблема происхождения культурных растений в современном понимании // Происхождение и география культурных растений, 1987: 147—161. Ленинград. (Vavilov N. I. 1929. Contemporary view on the problem of an origin of cultivated plants // Origin and geography of cultivated plants. Leningrad. 1987: 147—161. In Russ.)

Вавилов Н. И. 1935a. Растительные ресурсы земного шара и овладение ими // Происхождение и география культурных растений. Ленинград. 1987: 283—289. (Vavilov N. I. 1935a. Botanical-genetical basis of breeding // Origin and geography of cultivated plants. Leningrad. 1987: 289—334. In Russ.)

Вавилов Н. И. 1935 b. Ботанико-географические основы селекции // Происхождение и география культурных растений. Ленинград. 1987: 289—334. (Vavilov N. I. 1935 b. World plant resources and possessing them // Origin and geography of cultivated plants. Leningrad. 1987: 283—289. In Russ.)

Вавилов Н. И. 1940. Учение о происхождении культурных растений после Дарвина // Происхождение и география культурных растений. Ленинград. 1987: 382—401. (Vavilov N. I. 1940. The doctrine of origin of cultivated plants after Darwin // Origin and geography of cultivated plants. Leningrad. 1987: 382—401. In Russ.)

Варга Д. 1985. Древний Восток. Будапешт. (Varga D. 1985. Ancient East. Budapest.165 pp. Russ. transl.)

Гандилян П. А. 1980. Определитель пшеницы, эгилопса, ржи и ячменя. Ереван. 285 с. (Gandilian P. A. 1980. Key to the wheats, aegilopses, ryes and barley. Yerevan. 285 pp. In Russ.)

Гандилян П. А. 1988. Дикие сородичи культурных растений // Красная Книга Армении. "Айастан», Ереван. 246—256. (Gandilian P. A. 1988. Wild relatives of cultivatd plants // Red Book of Armenia. "Hayastan". Yerevan. 246—256 pp. In Russ.)

Гандилян П. А. 1991. Генофонд растений Армении // Бюлл. ВИР. СПб. Вып. 216: 18—21. (Gandilian P. A. 1991. Genofond of Armenian plants // Bull. WIR. SPb. 216: 18—21. In Russ.)

Декандоль А. 1885. Местопроисхождение возделваемых растений. Санкт-Петербург. 490 с. (пер. с франц. (De Candolle A. 1882. Origine de plantes cultivees. 468 pp. Russ. transl.).

Ефремов Ю. К. 1956. Армянское нагорье // Зарубежная Азия (Физическая география). Москва. 608: 136—146 (Yefremov Y. K. 1956. Armenian Highland // Foreign Asia (Physical geography). Moscow. 608: 136—146 pp. In Russ.)

Ефремов Ю. К. 1960. Армянское нагорье // Краткая географическая энциклопедия (в 5-ти томах). Москва. Т. 1: 138—139. (Yefremov Y. K. 1960. Armenian Highland // Geographical encyclopedia (in 5 volumes). Moscow. Vol. 1: 138—139 pp. In Russ.)

Жуковский П. М. 1971. Культурные растения и их дикие сородичи. Ленинград. 751 с. (Zhukovsky P. M. 1971. Cultivated plants and their wild relatives. Leningrad. 751 pp. In Russ.)
Комаров. В. Л. 1931.Происхождение культурных растений. Москва—Ленинград. 238 с. (Komarov V. L. 1931. Origin of Cultivated Plants. Moscow—Leningrad. 238 pp. In Russ.)
Сардарян С. А. 1954. Палеолит в Армении. Ереван.184с. (Sardaryan S. A. 1954. Palaeolith in Armenian. Yerevan. 184 pp. In Russ.)
Синская Е. Н. 1969. Историческая география культурной флоры (на заре земледелия). Ленинград. 479 с. (Sinskaya E. N. 1969. Historical Geography of Cultivated Plants (At the Dawn of Agriculture). Leningrad. 479 pp. In Russ.)
Степанян Н. П., Назарова Э. А. 2009. Армянское нагорье — один из Переднеазиатских очагов происхождения культурных растений // Конф. «Проблемы эволюции и систематики культуных растений», Ленинград: 375—379. (Stepanyan N. P., Nazarova E. A. 2009. Armenian Upland — one of the West Asian hearth of origin of cultivated plants // Conf. «Evolution and systematics of cultivated plants". Sanct-Peterburg: 375—379. In Russ.)
Тахтаджян А. Л. 1978. Флористические области Земли. Ленинград. 248 с. (Takhtajan A. L. 1978. The Floristic Regions of the World. Leningrad. 248 pp. In Russ.)
Чайльд Г. 1956. Древнейший Восток в свете новых раскопок. Изд. Иностр. Лит., Москва. 382 с. пер. с англ.: (Childe G. V. 1952. New Light on The Most Ancient East. London. 382 pp. Russ. transl.)
Aureche O. 2007. Das «Goldene Dreieck» und die Anfaenge des Neolithikums im Vorderen Orient // Vor 12.000 Jahren in Anatolien. Die aeltesten Monumenten der Menschenheit. Karlsruhe: 50—66.
Bobokhyan A. 2010. The newly discovered vishapakar from Aghtik and the problem of borders of vishapakars' spreading // Conf. «Ethnology and Archaeology of Armenia and Neiboring Countries», Yerevan: 11—13.
Damania A. B. 1997. Diversity of Major Cultivated Plants Domesticated in the Near East. The origin of Agriculture and crop domestication. Aleppo: 51—65.
Encyclopaedia Britannica. 2011. Armenian Highland // http://www.britannica.com/EBchecked/topic/35301/Armenian-Highland.
Gabrielian E., Zohary D. 2004. Wild relatives of food crops to Armenia and Nakhichevan // Flora Mediterranea, 14: 5—80, 94 maps.
Ghandilyan P., Avagyan A., Nazarova E. 2000. Diversity of wild relatives of cultivated plants in Armenia. // IPGRI, Newsletter for Europe, 17: 9.
Harlan J. R. 1997. Distribution of Agricultural Origins: A Global Perspective // The origins of Agriculture and Crop Domestication. Aleppo: 1—5.
Harris D. R. 1996. The origins and spread of agriculture and pastoralism in Eurasia: an overview // The origins and spread of agriculture and pastoralism in Eurasia. London: 552—575.
Hovsepyan R. A. 2004. Archaeobotanical finds of six-rowed barley (*Hordeum vulgare*) from the Neolithic layers (7th—6th millenia B. C.) of the Aratashen settlement of Armenia // Flora, veg. and plant res. of Armenia. Yerevan, 15: 123—125.
Hovsepyan R. A. 2010. Preliminary data on anthracological study at Godedzor Chalcolithic settlement (Armenia) // 12th Conference of Young Scientists «Ethnology and Archaeology of Armenia and Neiboring Countries», Yerevan: 47—48.
Hovsepyan R. A., Willcox G. 2008. The earliest finds of cultivated plants in Armenia: evidence from charred remains and crop processing residues in pisé from the Neolithic settlements of Aratashen and Aknashen // Veget. Hist. Archaeobot. 17: 63—71.
Luening J. 2007. Bandkeramiker und Vor-Bandkeramiker. Die Entstehung des Neolithikums in Mitteleuropa // Vor 12.000 Jahren in Anatolien. Die aeltesten Monumenten der Menschenheit. Karlsruhe: 177—189.
Stepanyan N. P. 2007. Armenian wild pomegranate: a rare and relic fruit // Bioversity International. Newsletter for Europe. Rome, 34: 6.
Thompson D. 1997. The Fertile Crescent (front cover) // Conservation, Management and Sustainable Use of Dryland Biodiversity within Priority Agro-Ecosystems of the Near East. ICARDA. Aleppo. 54 pp.
Zohary D., Hopf M. 1994. Domestication of plants in the old world. New York. 280 pp.
Zohary D., Hopf M. 2000. Domestication of plants in the old world. New York. 316 pp.

Institute of Botany, Armenian National Academy of Sciences, 0063, Yerevan, Acharian str. 1; ninastep@rambler.ru

---

А. С. АЛЕКСАНЯН

ОБ АВТОХТОННОЙ И АЛЛОХТОННОЙ ТЕНДЕНЦИЯХ В РАЗВИТИИ ФЛОРЫ АРИДНЫХ РЕДКОЛЕСИЙ ЮЖНОЙ АРМЕНИИ

Используя методику, предложенную Л. И. Малышевым (1969, 1972), рассчитаны показатели, позволяющие оценить степень автономности флор аридных редколесий Южной Армении. Показано, что в процессе становления этой флоры преобладала аллохтонная тенденция.

Аридные редколесья, аллохтонная тенденция, автономность флоры, автохтонность флоры

Ալեքսանյան Ա. Խ. Հարավային Հայաստանի արիդային նոսրանդրաոների ֆլորայի զարգացման ավտոխտոն եւ ալլոխտոն միտումների մասին: Օգտագործելով Լ. Ի. Մալիշեւի (1969, 1972) կողմից առաջարկված մեթոդիկան, հաշվարկվել են ցուցանիշներ, որոնք հնարավորություն են տալիս գնահատել Հարավային Հայաստանի արիդային նոսրանդրաոների ֆլորաների ավտոնոմության ասպիճանը: Ցույց է տրվել, որ արիդային նոսրանաոների ֆլորայի ձեւավորման մեջ գերակշռում են ալլոխտոն միտումները:

Արիդային նոսրանդրաոներ, ալլոխտոն միտումներ, ֆլորայի ավտոնոմություն, ֆլորայի ավտոխտոնություն

Aleksanyan A. S. On Autochthonous and Allochthonous Development Tends in of the Flora of Arid Open forests of South Armenia. Using the method offered by L. I. Malishev (1969, 1972), indicators allowing to estimate the autonomy degree of the floras of arid open forests of South Armenia have been calculated. It has been demonstrated that the allochthonous process predominates in the formation of flora of arid open forests of South Armenia.

Arid woodlands, allochthonous tendencies, autonomy of flora, autochthonous process

Аридные редколесья Армении в основном сосредоточены в ее южной части на территории 3 флористических районов: Дарелегисского, Зангезурского и Мегринского.

В течение последних лет нами проводилось планомерное исследование флоры и растительности редколесий Южной Армении, и в настоящее время практически выявлен состав их флоры, что позволило провести ее анализ. В настоящей статье мы останавливаемся на тенденциях, преобладавших в процессе ее развития.

Одной из важных сторон анализа той или иной флоры является изучение автохтонных и миграционных процессов в ее становлении. Определение этих тенденций обычно осуществляется на основе соотношения числа родов и видов, представленных в исследуемой флоре. Различные флоры с равным количеством видов могут значительно различаться по количеству родов. Очевидно, что в становлении флоры с большим количеством родов преобладала аллохтонная тенденция (Толмачев, 1974; Малышев, 1969, 1972). А. И. Толмачев (1974) считает, что чем больше среднее число видов в роде, тем сильнее выражены автохтонные процессы, и наоборот, низкое значение этого показателя указывает на большую роль миграционных процессов в становлении флоры. Данные по среднему количеству видов в роде во флорах редколесий отдельных флористических районов приведены в таблице 1.

Как следует из данных таблицы 1, наибольшее среднее число видов в роде отмечено для редколесий Дарелегисского флористического района. Отметим также, что этот показатель высок и во флоре степей данного района (Файвуш, 1990). Этот усредненный показатель по мнению Л. И. Малышева (1969), не пригоден для сравнения (кроме случаев, когда флоры содержат одинаковое количество видов и родов), так как между количеством видов и родов не наблюдается прямолинейной зависимости. Развивая это