Vavilov, a Soviet Darwinist in Mexico

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Nikolai I. Vavilov came to Mexico in 1930 and in 1932. In 1925 his working team visited the country in advance, where they contacted Alfonso L. Herrera and began work with Maximino Martínez, who was appointed by the Biological Studies Direction to accompany the Soviet Scientific Commission. Vavilov's research program on the origin of cultivated plants of the world continued de Candolle's project that was revised by Darwin and promoted in the 1960s and 70s by Jack R. Harlan and other researchers. Vavilov couldn't conclude his program due to obstacles presented by Lysenko. However, Vavilovian ideas are once again influential in Mexico. Currently, Vavilonian concepts are important in the discussions about the importance of a national food policy and the Biocultural heritage expressed in native corn and other vegetable resources in South/Central Mexico and Central America. This region, also known as the Mesoamerican Centre of Origin, has become endangered by the diverse environmental and food threats brought on by the introduction of genetically modified corn.

Keywords: Vavilov, Mexico, Martínez, Centres of origin, Cultivated plants, Genetics, Ethnobotany.

Darwin's theory of evolution has profoundly increased the scope of modern scientific thought. It has heavily influenced both the natural and social sciences, motivating the formation of groups and research programs with diverse orientations. An example of such a research program is that of Thomas F. Glick, who studies the impact of crucial ideas in science, analyzing their reception, introduction, tension, and rupture or adoption as related to evolutionism, relativity, and psychoanalysis (Glick, 1978, Glick & Henderson, 1999).

The further investigation of these theories and related personages, institutions, and processes in diverse contexts that cross epistemological, national, and cultural boundaries has enabled the recompilation of an important corpus of knowledge on specific cases, regions, and processes. It has also made possible the elaboration of interpretative frameworks and analytical categories that are applicable to the research of diverse processes in Latin America, such as the reception and introduction of Darwinism in Mexico and Bolivia during the period of 1870–1920 (Argueta, 2009). In the case of the latter, we found a group of important variables that promoted and hindered this introduction: individuals, social/academic networks, and institutions such as the school system and the Church. Furthermore, we found that in Mexico, as in many Latin American countries, the introduction of Darwinism was interpreted as the combination of Lamarckism and Darwinism. Ruiz has shown that it was an "incomplete" reception and introduction (Ruiz, 1987). Because of this, in later studies we have questioned who elucidated the concept of Darwinism or of the synthetic theory, specifically during the first half of the twentieth century. What we encountered in these studies were factors that established the framework for the reception and interpretation of Lysenkoism in Mexico during this same period. (Argueta, Noguera & Ruiz, 2003).

In the aforementioned studies, the analysis of Lysenko led us to Nikolai I. Vavilov, an important figure in the fields of Darwinism and Mendelian genetics in the Soviet Union, protagonist of a worldwide ethno-botanical project, and tireless traveler. Despite the fact that his work is fundamental in ethnobotany, agronomy, and genetics, and that he has visited Mexico on two separate occasions, he has received little attention in Mexican scientific historiography.

Therefore, the purpose of this article is to analyze the following: the fundamental aspects of this figure, the worldwide influence of the Vavilovian project, and the impact of his two visits to Mexico in 1930 and 1932–1933.

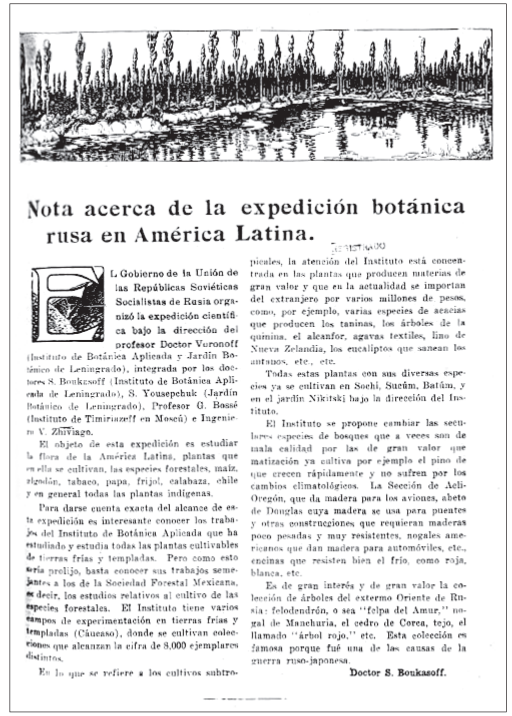
Brief biographical review of Nikolai I. Vavilov

The name Nikolai I. Vavilov doesn't currently carry much weight amongst the younger generation of students of biology, genetics, or agronomy. Nevertheless, some of his research and proposals have become essential in contemporary debates in Mexico on biodiversity conservation policies, germplasm banks, and genetically modified corn.

Although his scientific proposals are still considered valid, it seems that they have been eclipsed for political reasons and he has been largely excluded from the historical record of science.

Vavilov was born in Moscow on November 25, 1887. After graduating from the Institute Petrovskaya of Agriculture (Imperial Institute), he continued his studies in Germany, France, and England, where he worked under the direction of William Bateson, focusing on vegetable immunity (Bateson, 2002)[1]. In 1917, having returned to Russia, then under a revolutionary government, Vavilov became a professor of the Agronomical Faculty of Saratov University.

His research earned him many prizes: the Przhevalsky Medal of the Russian Geographical Society in 1926, the Lenin Prize the same year, and the gold medal of the International Conference of Agriculture in Rome in 1927. In 1929, he was elected member of the USSR Science Academy and president of the Lenin Academy of Agriculture. In 1930, he was elected director of the



Nota acerca de la expedición botánica rusa en América Latina.

El Gobierno de la Unión de las Repúblicas Soviéticas Socialistas de Rusia organizó la expedición científica bajo la dirección del profesor Doctor Voronoff (Instituto de Botánica Aplicada y Jardín Botánico de Leningrado), integrada por los doctores S. Boukasoff (Instituto de Botánica Aplicada de Leningrado), S. Yousepchuk (Jardín Botánico de Leningrado), Profesor G. Bossé (Instituto de Timiriazeff en Moscú) e Ingeniero V. Zhiviago.

El objeto de esta expedición es estudiar la flora de la América Latina, plantas que en ella se cultivan, las especies forestales, maíz, algodón, tabaco, papa, frijol, calabaza, chile y en general todas las plantas indígenas.

Para darse cuenta exacta del alcance de esta expedición es interesante conocer los trabajos del Instituto de Botánica Aplicada que ha estudiado y estudia todas las plantas cultivables de tierras frías y templadas. Pero como esto sería prolijo, basta conocer sus trabajos semejantes a los de la Sociedad Forestal Mexicana, es decir, los estudios relativos al cultivo de las especies forestales. El Instituto tiene varios campos de experimentación en tierras frías y templadas (Cáucaso), donde se cultivan colecciones que alcanzan la cifra de 8,000 ejemplares distintos.

En lo que se refiere a los cultivos subtropicales, la atención del Instituto está concentrada en las plantas que producen materias de gran valor y que en la actualidad se importan del extranjero por varios millones de pesos, como, por ejemplo, varias especies de acacias que producen los taninas, los árboles de la quinina, el alcanfor, agavas textiles, lino de Nueva Zelandia, los eucaliptos que sanean los pantanos, etc., etc.

Todas estas plantas con sus diversas especies ya se cultivan en Sochi, Sucúm, Batúm, y en el jardín Nikitski bajo la dirección del Instituto.

El Instituto se propone cambiar las seculares especies de bosques que a veces son de mala calidad por las de gran valor que matización ya cultiva por ejemplo el pino de que crecen rápidamente y no sufren por los cambios climatológicos. La Sección de Acli- Oregón, que da madera para los aviones, abeto de Douglas cuya madera se usa para puentes y otras construcciones que requieran maderas poco pesadas y muy resistentes, nogales americanos que dan madera para automóviles, etc., encinas que resisten bien el frío, como roja, blanca, etc.

Es de gran interés y de gran valor la colección de árboles del extremo Oriente de Rusia: felodendrón, o sea "felpa del Amur," nogal de Manchuria, el cedro de Corea, tejo, el llamado "árbol rojo," etc. Esta colección es famosa porque fué una de las causas de la guerra ruso-japonesa.

Doctor S. Boukasoff.

Figure No. 1. Boukasoff, S. "Nota acerca de la expedición botánica rusa en América Latina" (1925).

[1] William Bateson (1861–1926), biologist and founder of modern genetics.

Institute of Genetics of the USSR Science Academy and in 1931, president of the Geographical Society of the USSR. Another notable accomplishment which should not be ignored in the scientific historiography was his participation as a Soviet delegate with Nikolai Bukharin in the Second International Congress of History of Science and Technology that took place in London in 1931.

Vavilov was Vice-president of the Sixth International Congress of Genetics celebrated in Ithaca, New York in 1932 and was elected president of the seventh congress that was scheduled to take place in Russia in 1937. However, this congress was postponed until 1939 and moved to Edinburgh, but the Soviet authorities did not allow him to attend. In 1942, he was elected member of the Royal Society of London.

Beginning in 1930 the Soviet government monitored his movements. On June 22, 1941, when Germany invaded the Soviet Union, Vavilov was accused of sabotaging Soviet agriculture and espionage for the British government. On July 9 he was sentenced to be shot; however, the sentence was commuted to 20 years of corrective work. He died January 26 of 1943, hospitalized in the prison of Saratov (in the Ukrainian bank of the Volga) due to malnutrition and pneumonia[2].

Scientific work

"Harvester of life", "Father of applied phytogeography", "Universal ethnobotanist", "Russian encyclopedist", "Martyr of genetics", and "Galileo of the twentieth century" are a few of the names given to him by his friends and colleagues. These monikers demonstrate the rich and diverse vital activity displayed by Vavilov.

After learning about his project on the origin of cultivated plants, it is hard not to identify with the Russian scientist, to adopt his ideas as our own, and assign him a proper distinction. We've decided to call him: "the great seed explorer of the world". Even though the historiography of science exalts the voyages of Cook, Laperousse, La Condamine, Humboldt, d'Orbigny, Wallace, Bates, and especially of Darwin in the Beagle, Vavilov's trips should also be recognized: he explored more than 40 countries between 1916 and 1940 when the world wasn't conformed by more than 190 countries as it is today[3].

The aforementioned journey had three important purposes: (1) to collect useful plants of the world to compile the largest germplasm bank of the planet, (2) to determine the centres of origin of the cultivated plants of the world, and in accordance with his great dream, (3) to join the efforts of all scientists to end world hunger.

Without a doubt his most fascinating work was related to his ten monumental ethnobotanical voyages. It was during his eighth and ninth voyages when he visited Mexico and Latin America (see tabl. 1).

[2] See: *Pruna P.* El Caso Vavílov. Cuba: La Habana, 2010. 7 p. (Inédito).

[3] We should remember that the League of Nations, precursor of the United Nations, included in its origin in 1920, 42 countries as members. And the UN was founded in 1945 with 51 signing countries. Therefore, the number of countries explored by Vavilov was highly significant for his time.

Table 1. Sites visited during his ten trips[4]

1916 May-August	Expedition to Iran (Hamadan and Khorasan) and Pamir (Shungan, Rushan and Khorog)
1921–1922 May-January	Trip to Canada (Ontario) and the U.S. (New York, Pennsylvania, Maryland, Virginia, North and South Carolina, Kentucky, Indiana, Illinois, Iowa, Wisconsin, Minnesota, North and South Dakota, Wyoming, Colorado, Arizona, California, Oregon and Maine)
1924 July-October	Expedition to Afghanistan (Herat, Afghan Turkestan, Gaimag, Bamian, Hindu Kush, Badakhshan, Kafiristan, Jalalabad, Kabul, Herat, Kandahar, Baquia, Helmand, Farakh and Sehistan), accompanied by D. D. Bukinich and V. N. Lebedev
1925	Expedition to Khoresm (Khiva, Novyi Urgench, Gurlen and Tashauz)
1926–1927	Expedition to countries north and south of the Mediterranean Sea: France, Syria, Palestine, Transjordan, Algeria, Morocco, Tunisia, Greece, Sicily, the island of Sardinia, Cyprus, Creete, Italy, Spain, Portugal and Egypt. Expedition to Abyssinia, today Ethiopia (Djibouti, Addis Ababa, the Nile banks, the Tsana Lake), Eritrea (Massaua) and Yemen (Hodeida, Jidda and Hedjas)
1927	Exploration of the mountain regions of Wuerttemberg, in Bavaria, Germany
1929	Expedition to China (Xinjiang — Kashgar, Uch-Turfan, Aksu, Kucha, Urumchi, Kulja, Yarkand and Hotan) with M. G. Popov, and later alone to Taiwan, Japan (Honshu, Kyushu and Hokkaido) and Korea
1930	Expedition to the south of the U.S. (Florida, Louisiana, Arizona, Texas and California), and later, for the first time to three Latin American countries: **Mexico, Guatemala and Honduras**
1932–1933	Expedition to Canada (Ontario, Manitoba, Saskatchewan, Alberta and British Columbia); the U.S. (Washington, Colorado, Montana, Kansas, Idaho, Louisiana, Arkansas, Arizona, California, Nebraska, Nevada, New Mexico, North and South Dakota, Oklahoma, Oregon, Texas and Utah). Another expedition to **Latin America: Cuba, Mexico (only Yucatan), Ecuador (mountain ranges), Peru (Lake Titicaca, Puno and mountain ranges), Bolivia (mountain ranges), Chile, Brazil (Rio de Janeiro and the Amazon River), Argentina, Uruguay, Trinidad and Puerto Rico**
1921–1940	Systematic explorations of Western Russia and all the regions of the Caucasus and the Near East

Institute of Plant Industry (IPI or VIR in Russian) and the Centres of Origin, or the continuation of a Darwinian project

As a consequence of the ten great voyages and the participation of many collaborators that travelled around the planet (similar to Linneaus' apostles or Darwin's correspondents), Vavilov achieved the first of his objectives: to collect and integrate the first and largest germplasm bank

[4] www.vir.nw.ru/history/history.htm (visited in January, 2009)

in the world during his time including, according to the 1930 database, more than 300,000 samples of 1000 species of cultivated plants. In some of his letters he noted that although the US and Germany were also racing to collect and establish germplasm banks they were unable to keep up with the IPI.

Researchers that study the work of Vavilov have established a clear connection between the investigations of Alphonse de Candolle and those of Nikolai Vavilov (Smith, 1968). We consider that the fundamental link between these researchers was Darwin's work based on de Candolle's idea of centres of origin of cultivated plants (de Candolle, 1883). In this work Darwin reexamines Candolle's hypothesis and approaches his conceptions of ancestral forms, adaptive regions, and the history of most cultivated plants, that enabled him to conceive a single centre of origin for each species. These ideas were very useful to Darwin because they enabled him to explain domestication and specifically the concept of variation in a domestic state, a key issue in his theory of the origin of species by natural selection. The importance of these ideas was manifested in *The Origin of Species* (1876) and more extensively in *The Variation of Plants and Animals Under Domestication* (1875). In both texts de Candolle is one of the most frequently cited authors.

In Chapter XII of *The Origin of Species*, dedicated to biogeography, Darwin analyzed the idea of centres of origin, as is shown in the following:

> "Hence, it seems to me, as it has to many other naturalists, that the view of each species having been produced in one area alone, and having subsequently migrated from that area as far as its powers of migration and subsistence under past and present conditions permitted, is the most probable" (Darwin, 1876, p. 321).

And referring to this idea, he emphasized the following:

> "He who rejects it, rejects the *vera causa* of ordinary generation with subsequent migration, and calls in the agency of a miracle" (Darwin, 1876, p. 320).

Therefore, we can see that the theory of centres of origin in the context of phytogeography opposes the idea of a unique creation for all species or of successive creations proposed by catastrophists like Agassiz or d'Orbigny. Vavilov employed the proposals of de Candolle and Darwin, whom he read thoroughly (Vavilov, 1931; 1940), to elaborate the ambitious project dedicated to establish the centres of greater variability of cultivated vegetables. He studied these centres with great detail, collecting many samples, and this research gave way to texts of worldwide importance, such as *Studies on the Origin of Cultivated Plants* (1927) and other works published posthumously (1951, 1992, 1997).

Vavilov stated that an organism generates more diversity if it inhabits an area during a longer period of time and if in these areas the domestication of species is possible. He denominated these regions centres of origin and he considered subcentres to be areas with endemic forms that have high variability but no domestication.

Based on this concept he established the existence of eight centres of origin of cultivated plants around the world (see tabl. 2),[5] one of which was Southern Mexico and Central America. This explains his interest in this region.

[5] Later Vavilov reduced the eight centres to seven. He joined the Centre of Central Asia to the Chinese Centre (Vavilov, 1932).

Table 2. Centres of Origin of Cultivated Plants (Vavilov, 1929; 1934)[6]

Chinese Centre: Considered the largest and most ancient. It includes the mountain regions of the centre and west of China and the adjacent lower lands. 136 endemic plants were collected. Domestication of millet (*Panicum miliaceum*), soybean (*Glycine max*), yam (*Dioscorea batatas*), bean (*Phaseolus angularis*), sweet orange (*Citrus sinensis*), citrus lemon (*Citrus limon*), sorghum (*Andropogon sorghum*), pear (*Pyrus serotina*), apple (*Malus asiatica*), common apricot (*Prunus armeniaca*), cherry (*Prunus pseudocerasus*), nut (*Juglans sinensis*), litchi (*Litchi chinensis*) and ginseng (*Panax ginseng*), among other plants
Central Asia Centre: Includes Northeastern India (Punjab and Kashmir), Afghanistan, Tadzhikistan, Uzbekistan and Kirguizia. 43 endemic plants were registered. Common wheat (*Triticum compactum* and *T. sphaerococcum*), pea (*Pisum sativum*), lentil (*Lens sculenta*), herb cotton (*Gossypium herbaceum*), flax (*Linum usitatissimum*), pistachio (*Pistacia vera*), rye (*Secale cereale*), onion (*Allium cepa*) and grape (*Vitis vinifera*)
3. Indian Centre, with two subcentres: **Principal centre:** Includes India and Birmania but not Northwestern India, the Punjab but not provinces of the northwestern border. 117 endemic species were found here. Domestication of rice (*Oryza sativa*), chickpea (*Cicer arietinum*), sugar cane (*Saccharus officinarum*), eggplant (*Solanum melongena*), mung bean (*Phaseolus mungo*), coconut (*Cocos nucifera*), mango (*Mangifera indica*), tamarind (*Tamarindus indica*), cinnamon (*Cinnamomum zeylanicum*), indigo (*Indigofera tinctoria*), cotton (*Gossypium arboretum*), jute (*Corchorus capsularis*) and cucumber (*Cucumis sativus*), among other plants. **Indo-Malayan Centre:** Includes Indochina and the Malay Archipelago (Java, Borneo, Sumatra), Philipines and Vietnam. 55 endemic plants were found: banana (*Musa cavendishi, M. paradisiacal, M. sapientum*), breadfruit (*Artocarpus communis*), mangosteen (*Garcinia mangostana*), clove (*Caryophyllus aromaticus*), nutmeg (*Myristica fragans*), black pepper (*Piper nigrum*), among others
4. Near Eastern Centre: Includes the interior of Asia Minor, Transcaucasia, Iran and the highlands of Turkmenistan. 83 plants were registered. Domestication of wheat (*Tritricum monococcum, T. durum, T. vulgare, T. orientale*, many varieties; the most important centre for wheat), barley (*Hordeum districhum*), oat (*Avena sativa, A. byzantina*), rye (*Secale cereale*), apple (*Malus sylvestris var. paradisiacal*), quince (*Cydonia oblonga*), pear (*Pyrus communis*), sour cherry (*Prunus cerasus*), common fig (*Ficus carica*), pomegranate (*Punica granatum*), alfalfa (*Medicago sativa*), clover (*Trifolium resupinatum*), and various vegetables
5. Mediterranean Centre: Includes the complete Mediterranean coast and Northern Africa. 84 plants. Domestication of vegetables (high diversity and the most important for vegetables): sugar beet (*Beta vulgaris*), lettuce (*Lactuca sativa*), kale (*Brassica oleracea*), common asparagus (*Asparagus officinalis*), olive (*Olea europea*) black mustard (*Brassica nigra*), some fodder crops (*Trifolium alexandrinum*), flax (*Linum flavum*), and oat (*Avena brevis*)
6. Abyssinian Centre: Includes Ethiopia, part of Somalia and Eritrea's hills. 38 species. Domestication of different types of wheat (*Tritricum durum abyssinicum*), (*Tritricum turgidum abyssinicum*), barley (*Hordeum sativum*), sorghum (*Andropogon sorghum*), linseed (*Linum usitatissimum*), coffee (*Coffea arabica*), sesamo (*Sesamun indicum*) and castor oil (*Ricinus communis*)
7. Centre of the south of Mexico and Central America: Includes the south of Mexico and Central America. It has 66 endemic species. Domestication of corn (*Zea mays*), bean (*Phaseolus coccineus*), squash (*Cucurbita ficifolia*), red pepper (*Capsicum annum*), tomato (*Lycopersicum cerasiforme*; 'jitomate' in Spanish), princes feather (*Amaranthus* hipocondriacus), christopohine (*Sechium edule*), cotton (*Gossypium purpurascens*), sweet potato (*Ipomea batatas*), agave maguey (*Agave cantala*), cocoa (*Theobroma cacao*), various species of prickly pears (*Opuntia amyclaea*), papaya (*Carica papaya*), avocado (*Persea americana*), wild black cherry (*Prunus serotina*), sunflower (*Helianthus anuus*) and tobacco (*Nicotiana rustica*)

[6] Taken from Hernández Xolocotzi, 1980, quoting Vavilov, 1951 with additional information from Bailey, 1949, and the Botanical Garden of Cordoba (Jardín Botánico de Córdoba) in Spain, 1992. Only some plants of each centre are indicated.

8. South American Centre, with three subcentres (62 plants were registered).
Peruvian, Ecuadorean and Bolivian Subcentre: Areas of high mountains, coasts and tropical and subtropical zones of the mentioned countries and of Colombia. Domestication of potato (*Solanum andigenum*), tomato (*Physalis peruviana*; 'tomate' in Spanish), quinoa (*Cinchona officinalis)* sieva bean (*Phaseolus lunatus*), guava (Psidium guajava), squash (*Cucurbita maxima*), amylaceous corn (*Zea mays amylacea*), tobacco (*Nicotiana tabacum*) and cotton (*Gossipyum barbadense*).
Chiloe Subcentre: Island south of Chile. An important centre of varieties and domestication of common potato (*Solanum tuberosum*) and of woodland strawberry (*Fragaria chiloensis*).
Brazilan-Paraguayan Subcentre. Area with great variation of yucca (*Manihot utilissima*), peanut (*Arachis hypogea*), rubber (*Hevea brasiliensis*), pineapple (*Ananas comosus*), Brazil nut (*Bertholletia excelsa*), Passion fruit (*Passiflora edulis*)

Relations with Mexico (1925–1933)

Vavilov visited 13 Latin American countries; however, we have discussed this in another text (Argueta Villamar & Argueta Prado, 2010). In this article we will focus primarily on his relationship with Mexico.

Vavilov's trip to Mexico must be contextualized in a particular historical framework based on the scientific relations of Mexico and the Soviet Union that go back to Dr. Daniel Vergara Lope and Ivan Petrovich Pavlov's trips in 1897 (Izquierdo, 1968, p. 1102)[7]. The relationship between these countries became closer some years later, starting in 1924 when Mexico recognized the Soviet state and established diplomatic relations. Following this line of thought, Vavilov's connections with Mexico must be viewed in the context of historical Mexican/Soviet relations in such a way that allows us to effectively expound upon (1) the 1925 voyage of the Soviet Scientific Commission (SSC)[8], and (2) Vavilov's research and presence in Mexico in 1930 and 1932–1933.

Soviet Scientific Commission in Mexico

The close relationship that occurred between Mexican and Soviet scientific communities should be understood as a consequence of their ideological proximity due to their respective revolutions: the Mexican in 1910 and the Soviet in 1917. However, it was a complicated proximity. During certain periods the relation was fractured. Nevertheless, the emergence of progressive revolutionary processes in both countries generated an affinity between the states and marked a new era in Mexican/Soviet relations in politics and science.

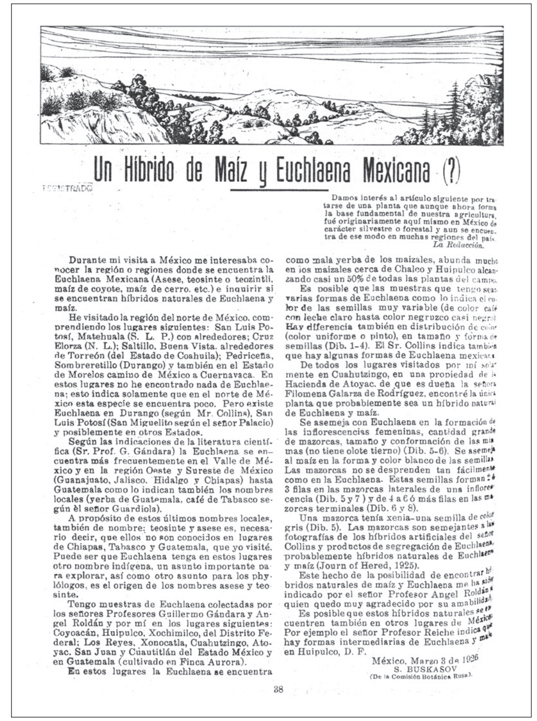
As has been indicated, the relationship between Mexico and the Soviet Union officially began in 1924 when Mexico recognized the Soviet state and diplomatic relations where established. This is significant because Mexico was the first country in the American continent that

[7] Izquierdo states that Vergara's visit was made days after his attendance to the XIII International Congress of Medicine that took place in Saint Petersburg. We should indicate that Daniel Vergara Lope, at the time assistant professor of physiology of the National Institute of Medicine, published various articles written with Alfonso L. Herrera on the influence of height in the constitution and development of organisms (Herrera & Vergara Lope, 1895-1896; 1896; 1897–1898; 1899). That is why Alfonso L. Herrera received the commission in 1925.

[8] Also named Soviet Explorer Commission, Russian Scientific Commission, Russian Botanical Commission, Russian Botanical Expedition.

formalized diplomatic relations with the USSR (Dik, 1996). However, in terms of our study it is even more significant that few months later the first Soviet Scientific Commission arrived in Mexico. This indicates, on one hand, the interest of the Soviet Union to strengthen relations with a western country and, on the other, that the ideological affinity between both states favored scientific links between the countries.

Professors S. Bukasov (or Boukasoff), S. Juzepschuk (or Yousepchuck), G. Bossé, and V. Zhiviago arrived in Mexico at the end of 1925 under the direction of Dr. Voronoff in order to study the uses and commercial potential of Latin American flora (Boukasoff, 1925). This trip represents the first important step of the Bureau of Applied Botany, afterwards known as the Institute of Plant Industry, IPI, or VIR, the great institution founded by Vavilov in 1921[9].



Un Híbrido de Maíz y Euchlaena Mexicana (?)

REGISTRADO

Damos interés al artículo siguiente por tratarse de una planta que aunque ahora forma la base fundamental de nuestra agricultura, fué originariamente aquí mismo en México de carácter silvestre o forestal y aun se encuentra de ese modo en muchas regiones del país.
La Redacción.

Durante mi visita a México me interesaba conocer la región o regiones donde se encuentra la Euchlaena Mexicana (Asese, teosinte o teozintli, maíz de coyote, maíz de cerro, etc.) e inquirir si se encuentran híbridos naturales de Euchlaena y maíz.

He visitado la región del norte de México, comprendiendo los lugares siguientes: San Luis Potosí, Matehuala (S. L. P.) con alrededores; Cruz Elorza (N. L.); Saltillo, Buena Vista, alrededores de Torreón (del Estado de Coahuila); Pedriceña, Sombreretillo (Durango) y también en el Estado de Morelos camino de México a Cuernavaca. En estos lugares no he encontrado nada de Euchlaena; esto indica solamente que en el norte de México esta especie se encuentra poco. Pero existe Euchlaena en Durango (según Mr. Collins), San Luis Potosí (San Miguelito según el señor Palacio) y posiblemente en otros Estados.

Según las indicaciones de la literatura científica (Sr. Prof. G. Gándara) la Euchlaena se encuentra más frecuentemente en el Valle de México y en la región Oeste y Sureste de México (Guanajuato, Jalisco, Hidalgo y Chiapas) hasta Guatemala como lo indican también los nombres locales (yerba de Guatemala, café de Tabasco según èl señor Guardiola).

A propósito de estos últimos nombres locales, también de nombre: teosinte y asese es, necesario decir, que ellos no son conocidos en lugares de Chiapas, Tabasco y Guatemala, que yo visité. Puede ser que Euchlaena tenga en estos lugares otro nombre indígena, un asunto importante para explorar, así como otro asunto para los phylólogos, es el origen de los nombres asese y teosinte.

Tengo muestras de Euchlaena colectadas por los señores Profesores Guillermo Gándara y Angel Roldán y por mí en los lugares siguientes: Coyoacán, Huipulco, Xochimilco, del Distrito Federal; Los Reyes, Xonocatla, Cuahutzingo, Atoyac, San Juan y Cuautitlán del Estado México y en Guatemala (cultivado en Finca Aurora).

En estos lugares la Euchlaena se encuentra como mala yerba de los maizales, abunda mucho en los maizales cerca de Chalco y Huipulco alcanzando casi un 50% de todas las plantas del campo.

Es posible que las muestras que tengo sean varias formas de Euchlaena como lo indica el color de las semillas muy variable (de color café con leche claro hasta color negruzco casi negro). Hay diferencia también en distribución de color (color uniforme o pinto), en tamaño y forma de semillas (Dib. 1-4). El Sr. Collins indica también que hay algunas formas de Euchlaena mexicana.

De todos los lugares visitados por mí solamente en Cuahutzingo, en una propiedad de la Hacienda de Atoyac, de que es dueña la señora Filomena Galarza de Rodríguez, encontré la única planta que probablemente sea un híbrido natural de Euchlaena y maíz.

Se asemeja con Euchlaena en la formación de las inflorescencias femeninas, cantidad grande de mazorcas, tamaño y conformación de las mismas (no tiene olote tierno) (Dib. 5-6). Se asemeja al maíz en la forma y color blanco de las semillas. Las mazorcas no se desprenden tan fácilmente como en la Euchlaena. Estas semillas forman 2 ó 3 filas en las mazorcas laterales de una inflorescencia (Dib. 5 y 7) y de 4 a 6 ó más filas en las mazorcas terminales (Dib. 6 y 8).

Una mazorca tenía xenia-una semilla de color gris (Dib. 5). Las mazorcas son semejantes a las fotografías de los híbridos artificiales del señor Collins y productos de segregación de Euchlaena, probablemente híbridos naturales de Euchlaena y maíz (Journ of Hered, 1925).

Este hecho de la posibilidad de encontrar híbridos naturales de maíz y Euchlaena me ha sido indicado por el señor Profesor Angel Roldán a quien quedo muy agradecido por su amabilidad.

Es posible que estos híbridos naturales se encuentren también en otros lugares de México. Por ejemplo el señor Profesor Reiche indica que hay formas intermediarias de Euchlaena y maíz en Huipulco, D. F.

México, Marzo 3 de 1926
S. BUSKASOV
(De la Comisión Botánica Rusa).

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Figure No. 2. Bukasov, S. "A Study on a hybrid of Corn and *Euchlaena mexicana* (1926).

When the Soviet scientists arrived in Mexico they relied on the aid of important figures of Mexican science such as Alfonso L. Herrera; Maximino Martínez, director of the Biological Studies Direction; and Miguel Angel de Quevedo, president of the Mexican Forest Society (La Redacción, 1925).

The aid of Mexican scientists was crucial for the Soviet expedition because it permitted the Soviet scientists to establish connections with the Mexican scientific community, to familiarize themselves with the most important sources of botanical information and applicable research institutions, and to move with ease around the country. This was made possible primarily by Maximino Martínez, who was assigned by Alfonso L. Herrera to accompany the members of the commission during the trip.

Between October 25 and November 26 professors Bukasov (expert in *Solanacea*), Juzepschuk, and Bossé, accompanied by professor Martínez, traveled the states of Coahuila, Durango, Chihuahua, San Luis Potosi, Queretaro, and Jalisco. Maximino Martínez published a summary of the expedition in the magazine *Forest Mexico* (*México Forestal*) in which he highlighted the botanical richness in desert and semi-desert regions, and the diversity of herbaceous plants adapted to droughts with potential commercial uses (Martínez, 1926).

During the expedition, the commission assembled a collection of endemic samples and authored a manual of the uses of the encountered species, an interesting ethnobotany manual, as well as a brief analysis of the possible commercial uses of these species. Two articles derived

[9] Most of them were from the Institute of Applied Botany and Botanical Garden in Leningrad, only Bossé worked in the Timiriazev Institute, in Moscow.

from the observations of professor Bukasov appeared in the magazine *Forest Mexico*. The first was a general outline of the purposes of the expedition that highlighted the importance of their findings in relation to the Soviet Union because, according to Bukasov, many of the natural resources employed in the USSR were imported at a high cost to Soviet economy. The second published article consisted of a study on a hybrid of corn and *Euchlaena mexicana* (Bukasov, 1926)[10].

The work of the Soviet Scientific Commission was very important if we consider that, aside from studying the biotic resources of the country, it established various relations that eventually laid down the groundwork for future visits of Soviet scientists. It also allowed Mexican scientists access to Soviet germplasm research and Eastern European scientific enterprises in general. Therefore, the first Soviet Scientific Commission constructed a bridge that would later be used to transport other actors, samples, and ideas from one side of the Atlantic to the other.

Vavilov in Mexico

A second period of great importance for the scientific relations between Latin America and the Soviet Union was when Nikolai I. Vavilov traveled to Mexico in 1930 and 1932–1933[11].

Vavilov's first trip to Mexico and Central America took place in 1930 after a long stay in the southern region of the United States. Due in part to the connections that had been established by the Soviet Commission, he received a warm welcome in Mexico which made his work there considerably easier. Ambartsumov has shown that, apart from these connections, Vavilov exchanged letters with important figures of the Mexican academy such as Alfonso Pruneda[12], rector of the National Autonomous University of Mexico (UNAM); Isaac Ochoterena, director of the Institute of Biology of the UNAM (prior Direction of Biological Studies chaired by Alfonso L. Herrera); and "a high ranking official of the Agriculture Secretary, mister Maximiliano Martínez" (sic) (Ambartsumov, 2001, p. 9)[13].

The international relevance of Vavilov's work in the Soviet Union and the attention he received in the Mexican media after the Soviet Scientific Commission's 1925 trip to Mexico made Vavilov an important figure amongst Mexican scientific circles; consequently, during his first stay in Mexico the Mexican Society of Agronomy named Vavilov an Honorary Member. In his thank-you speech he surely read some paragraphs from the article *Mexico and Central America, As the Principal Centre of Origin of the Cultivated Plants of the New World* (Vavilov, 1931). In this article Vavilov demonstrated the profound influence that the region and culture had exerted over him stating:

> "In Southern Mexico and in Central America the investigator of cultivated plants feels himself, in the full meaning of the word, in the very furnace of creation" (Vavilov, 1931, p. 188).

[10] These referred articles can be consulted at the end of the text.

[11] Sergei Eisenstein, famous soviet filmmaker was also in Mexico between 1930–1932 (Vega Alfaro, E.)

[12] Pruneda was rector of the UNAM from December 30 of 1924 to November 30 of 1928 and surely the communication began during preparations of the visit of Bukasov and Vavilov. However, when Vavilov first came to Mexico Pruneda was no longer rector.

[13] A misnomer. In reality Maximino Martínez was a botanist and ethnobotanist who at the time worked in the Direction of Biological Studies (DBS) under the direction of Alfonso L. Herrera, who assigned him the duty of accompanying the Soviet Scientific Commission in their explorations of the centre and north of the country. After the DBS was closed in 1929 he worked in the Agriculture Secretary.

Vavilov asserted that this statement was not only due to the existence of the numerous new species of cultivated plants in the region that he and his collaborators found, nor to the enormous amount of races, subraces, and varieties, but because he observed something that greatly excited him: he "discovered" that farmers left wild trees, relatives of their domesticated counterparts, when clearing forest to make space for planting. This implies that the fruit trees remained connected to their wild relatives, a custom similar to what Bukasov had observed in Mexican corn farming practices in 1925[14]. He indicated the importance of his observation pointing out that:

> "In distinction of some Asiatic and African centres of agriculture (for instance Abyssinia, Afghanistan), a very characteristic feature of Central America and Mexico is that for many of the cultivated plants the corresponding wild links are present. For one half, if not for the majority of endemic cultivated plants in Central America and Mexico, all phases of their introduction into cultivation may be traced. Thus, the fruit trees of Mexico and Central America are directly connected with their wild relatives. In clearing forests, the farmer leaves the wild Mexican plum, *Spondias mombin*, and *Psidium guajava*, the hawthorn, in the fields. These facts have been frequently observed by us in Guatemala and in Southern Mexico" (Vavilov, 1931, p. 188).

And as a footnote, Vavilov also wrote:

> "The same may be observed in the Old World in regard to wild pear and apple trees, in the Caucasus and in Turkestan." (Vavilov, 1931, p. 188).

The above article is relevant because it elucidates a group of traditional agricultural practices and also one of the worldwide centres of domesticated vegetables. It is important to note that although Vavilov made reference to over two-dozen French, American, German, Russian, and other international authors, he only referenced one Mexican study, *Useful plants of the Mexican Republic* written by Maximino Martínez (Vavilov, 1931, p. 186), an author with whom the Soviet Scientific Commission had established connections and was surely in contact with Vavilov during his stay in Mexico.

Centres of origin today

Today centres of origin of cultivated plants are known as *Vavilov Centres*. They are still a point of scientific interest and new vegetable varieties, races, and subraces are being discovered because selection under domestication is still a common practice in farm communities around the world. Numerous new research groups have come from Europe and North America to intertropical regions, for example, in the 60's to investigate corn biodiversity and to produce hybrids during the Green Revolution, and currently to promote genetically modified organisms and cell lines.

In 1971 Jack Harlan analyzed what he called "Vavilov's theory". He stated:

> "For nearly half a century the charisma of N. I. Vavilov and the elegant simplicity of his methodology have dominated theories and concepts about the origin of cultivated plants… <…> …but Vavilovian theory has been virtually demolished by other sources of evidence" (Harlan, 1971, p. 468).

[14] *Boukasoff S.* Los Recursos Forestales en las Regiones del Secano de México // México Forestal. 1925. Vol. 3. № 11–12. P. 171.

Harlan adds:

> "The modern approach is more in the tradition of De Candolle than Vavilov, in that it attempts to integrate all sources of information" (Harlan, 1971, p. 468).

Research on sorghum suggested to Harlan that domestication of this species didn't take place in a focal point (that for Vavilov was Ethiopia), but in every African savanna. This assumption is based on the evidence that cultivated forms are more similar to wild ones of each region than to other cultivated forms of different areas. This pattern is present in many other crops, for example, beans in America and rice in Asia. He considered that it was a diffuse and acentric domestication and proposed the theory of the complex of three centres and non-centres in the world. Referring to it he concluded:

> "…that agriculture originated independently in three different areas and in each case a system composed of a centre of origin and a non-centre emerged. The first system was, without a doubt, the centre of the Near East and its non-centre was Africa, the second system was Northern China and its non-centre was Southeast Asia and the Southern Pacific, and the third one was Mesoamerica and its non-centre South America" (Harlan, 1971, p. 473)[15].

In our view, Harlan's proposal complements and refines Vavilov's theory of centres and subcentres.

Vavilov made two other important contributions: the law of emancipation of recessives[16] and the law of homologous series. The second law was proposed in 1920 and states that in a given area similar patterns of variation in genetically related species and genera occur. Therefore, says Vavilov, if we know the variation of a species in a specific area we can predict a parallel variation in proximate species or genera. This is a consequence of parallel evolution from a common ancestor[17].

Even though it seems that the law of homologous series didn't have much impact at the time, Kupzow wrote:

> "Further support for Vavilov's Law of Homologous Series in Variation is provided by Harlan, de Wet and Price (1973). These authors present a better understanding of the genetic basis for homologous variation" (Kupzow, 1975, p. 372).

This law is referenced in *Economic Botany*:

> "After a half century from its formulation this law is still actively discussed among geneticists and plant breeders. Today the parallelism in variation patterns in plants and animals is studied with modern biogenetical methods and described with precision exceeding that possible during Vavilov's time. It turns out that plants and animals vary similar ways when subjected to similar selection pressures" (Editors of Economic Botany, 1975, p. 372)[18].

[15] In 1997 a symposium in honor of Jack R. Harlan was held in Syria. It was named *The Origins of Agriculture and Crop Domestication*. The initial presentations were dedicated to discussing Vavilov and Harlan's legacy. See The Origins of Agriculture and Crop Domestication, 1998.

[16] The first law states that the frequency of recessive homozygous increases as we move farther away from the centre of origin. This phenomenae is mainly a consequence of genetic drift, associated with migrations of groups of individual specimens of a species away from its centre of origin.

[17] The name of this law recalls Darwin's "correlated variation of homologous parts" (see *Variation of animal and plants under domestication* of Darwin, 1875, p. 314) but refers to different aspects.

Afterwards, at the Harlan symposium, J.G. Hawkes, one of the most experienced phytogeneticists, affirms this in his inaugural presentation titled "Back to Vavilov: Why Were Plants Domesticated in Some Areas and not in Others?":

> "Similar selection pressures even in unrelated crops produced similar types of adaptation, a process developed by Vavilov into his Law of Homologous Series (…) just one of the extraordinarily innovative ideas put forward by the great genius, N.I. Vavilov" (Hawkes, 1998).

Fighting hunger in the world

Vavilov's third objective was never accomplished. In 1933 just as he finished his ninth trip he was officially accosted by the Soviet state. Vavilov ignored this opposition to the best of his ability; however, in this moment his project began to be eclipsed by Trofim D. Lysenko, who appeared in the Soviet agronomic scene in 1927. When Stalin officially backed Lysenko in 1935, he launched a strong offensive against the other Soviet geneticists (Argueta, Noguera & Ruiz, 2003). As we have indicated, Vavilov had been monitored by Soviet government spies since 1930. Accused and sentenced in 1941, he died in 1943. Years later Theodosius Dobzhansky wrote an article in his honor that he named "N.I. Vavilov, a Martyr of Genetics" (Dobzhansky, 1974).

Although he didn't eliminate world hunger, it is important to note that no scientist after Vavilov has found a solution to this grave problem[19].

In Mexico we continue to remember Vavilov as we oppose the release of genetically modified corn in national territory. We base this opposition on facts that Vavilov posited and Harlan confirmed: it is a region of endemisms, great variability, a centre of origin, and a centre of domestication.

At the beginning of 2009, an experimental dissemination of genetically modified corn began in Chihuahua, a Mexican state that shares a border with the United States. Supposedly there is no risk of contaminating native corn. Even though most races of corn are found in the centre and south of the country; the review *Races of Maize in Mexico, Their Origin, Characteristics and Distribution* of Wellhausen, Roberts, and Hernández (1951); or the more recent review of Ortega Paczka (2003); establishes that in Chihuahua at least three native races are cultivated: Reventador, Cónico and Tuxpe o.

In accordance with Vavilov's legacy, it is clear that we don't have to risk our valuable Biocultural patrimony (Boege, 2008; Toledo & Barrera-Bassols, 2008) by introducing corn of doubtful food quality that promises more productivity but implies higher costs in supplies (as occurred with grains in the green revolution). Furthermore, the use of geneti-

[18] *Richard E.* Schultes was editor of *Economic Botany* in that year.

[19] In 1970 the Nobel Peace Prize was given to Norman Borlaug for his innovations in the field of wheat genetics and for carrying out the Green Revolution. However, we cannot affirm that his innovations have eliminated hunger in India, Pakistan and Mexico, places where he worked and where his projects were implemented. Of the more than 6,000 million habitants of the world, approximately 1000 million subsist with low or very low levels of food intake. Furthermore, we find areas of permanent famine.

cally modified maize binds farmers to eight big commercial companies, obligating them to buy seeds and supplies from said companies, permanently jeopardizing the possibility of national food sovereignty. In Mexico, as in many other places of the world, local knowledge has made possible the autonomy, conservation *in situ,* and experimentation of farmers (Paczka, 2010; Díaz Tepepa & cols., 2010). It is important to recognize that social innovation resulting from a learning dialogue amongst self-sufficient farmers can give way to new and useful proposals.

Final reflections

We can learn much from the study of Vavilov's life and work: the great energy he displayed in his diverse field explorations, his visits to herbariums and museums, the libraries he consulted, the conferences he presented, the reception he received in the academic communities of the countries he visited, his promotion of Mendelian Darwinism that was already under attack in his own country by Lysenko, his determination to establish the largest collection of germplasm in the world in an attempt to combat world hunger, and his legacy that persists in its importance. During his lifetime this legacy was known as "Vavilov's ghost", a phenomenon that continues to emerge in his work, laws, collections, and research centres.

Vavilov was vindicated in the times of Nikita Jruschov, Stalin's successor. In 1967 he received the first public tribute since his death: his published works were reedited and those that hadn't been published were edited and released. In 1987 a celebration honoring the one-hundredth anniversary of his birth was realized by the Academy of Science, where the Vavilov Medal was instituted and was awarded to Jack R. Harlan. The Institute of Plan Industry was reopened and has acquired international support in order to continue developing Vavilov's research. In 1997 the International Plant Genetic Resources Institute (IPGRI) in Rome, Italy, edited for the first time in English his primary work *Five Continents*, and established the Vavilov-Frankel Prize for researchers that study cultivated plants and genetics.

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References

Ambartsumov Evgueni A. El enciclopedista Ruso Nikolai L. Vavilov en México // Revista del Centro de Investigación, Universidad La Salle. January-June, vol. 4, no. 016, Ciudad de México, 2001. P. 9.

Argueta A., Noguera R. & Ruiz R. La recepción del lysenkismo en México // Asclepio. Madrid. 2003. Vol. 55. Fasc. 1. P. 235–262.

Argueta A. El Darwinismo en Iberoamérica. Bolivia y México. Madrid, CSIC & Los Libros de la Catarata, 2009. 350 p.

Argueta Villamar A., Argueta Prado Q. Vavilov, un darwinista soviético en América Latina (1930–1933) // cords. R. Ruiz, M.A. Puig, G. Zamudio. El Darwinismo en América Latina y Europa. México: Ciudad de México, CSIC-UNAM-AMC, 2010 (In print).

Argueta Prado Quetzal. La revista Ciencias (1945–1970). Contribuciones a la ciencia mexicana del siglo XX. México: Instituto de Investigaciones Históricas, UMSNH y Academia Mexicana de Ciencias, 2010. 267 p.

Bateson Patrick. William Bateson: a biologist ahead of his time // Journal of Genetics. 2002. Vol. 81. № 2 P. 49–58.

Bailey L. H. Manual of Cultivated Plants. New York: MacMillan, 1949. 1116 p.

Boege E. El patrimonio biocultural de los pueblos indígenas de México. Ciudad de México, INAH-CONABIO, 2008. 342 p.

Boukasoff S. Nota acerca de la expedición botánica rusa en América Latina // México Forestal. 1925. Vol. 3. № 11–12. P. 171.

Bukasov S. Un Híbrido de Maíz y *Euchlaena Mexicana* // México Forestal. 1926. Vol. 4. № 3–4. P. 38–39.

Bukasov S.M. The cultivated plants of México, Guatemala and Columbia. Suppl. to the Bull. of Appl. Botany. Leningrad, 1931.

Bukasov S. M. Las plantas cultivadas de México, Guatemala y Colombia. San José de Costa Rica, Turrialba, Centro Agronómico Tropical de Investigación y Ense anza, 1981.

Bukasov S. M. Sistemática de las especies de papa sección Tuberarium (Dun) Buk. Género *Solanum* L. Cusco, Universidad Nacional San Antonio Abad del Cusco. IICA-CIID Project, 1981.

Candolle Alphonse De. Origines des plantes cultivées. 1883.

Darwin Ch. The origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. 6th ed., with additions and corrections. London: John Murray, 1876. 458 p.

Darwin Ch. The variation of animals and plants under domestication. 2d ed. (Final text), London: John Murray, 1875. Vol. 1. 476 p.; Vol. 2. 496 p.

Díaz Tepepepa, María Guadalupe et al. Innovar en la tradición. La construcción local de los saberes campesinos en procesos interculturales // Argueta A., Corona-M.E., Hersch P. Saberes locales y diálogo de sabers. Ciudad de México, CRIM, UNAM; Centro INAH Morelos, Seminario Sociedad del Conocimiento y Diversidad Cultural, UNAM, 2010. 528 p. (In print)

Dictionnaire du darwinisme et de l'évolution / dir. P. Tort. 3 vols. Paris: PUF, 1996. 5000 p.

Dik E. Las relaciones entre México y Rusia 1741–1991 y su impacto en México // Estudios: Filosofía-Historia-Letras. 1996. № 44.

Dobzhansky Th. N.I. Vavilov: A Martyr of Genetics 1887–1942 // Journal of Heredity. 1947. Vol. 38. № 8. P. 227–232 (http://jhered.oxfordjournal.org) (Consultada: septiembre 2009)

Editors Of Economic Botany. Note to the article of Alexander J. Kupzow // Economic Botany. 1975. Vol. 29. P. 372–379.

Esteva G., Marielle C. (coords.) Sin maíz no hay país // Ciudad de México, CNCA/MNCP. 2003. P. 123–154.

Glick Th.F. La transferencia de las revoluciones científicas a través de las fronteras culturales // Ciencia y Desarrollo. Ciudad de México. 1978. № 72. P. 77–89.

Glick Th.F., Henderson M.G. Las recepciones científicas y populares de Darwin, Freud y Einstein: Hacia una historia analítica de la difusión de las ideas científicas // Glick Th., Ruiz R., Puig-Samper

M.A. El darwinismo en Espa a e Iberoamérica. Madrid: UNAM, CSIC, Ediciones Doce Calles, 1999. P. 289–297.

Golubev Georgii G. Nikolai Vavilov: the great sower, pages from the life of the scientist. Moscow: Mir, 1987.

Harlan J.R. Agricultural origins: Centers and noncenters // Science. 1971. Vol. 174. P. 468–474.

Harlan J. R., De Wet J. M., Price G. Comparative evolution of cereals // Evolution. 1973. V. 27. P. 311–325.

Hawkes J.G. Back to Vavilov: Why Were Plants Domesticated in Some Areas and Not in Others? // The Origins of Agriculture and Crop Domestication / eds. A.B. Damania, J. Valkoun, G. Willcox & C.O. Qualset. ICARDA, Aleppo, Syria, 1998. xi + 345 p.

Hernández Xolocotzi E. Lecturas en Etnobotánica. Ciudad de México, Colegio de Postgraduados, 1980.

Herrera A.L., Vergara Lope D. La atmósfera de las altitudes y el bienestar del hombre // Memoria de la Sociedad Científica A. Alzate. 1895–1896. № 9. P. 163.

Herrera A.L., Vergara Lope D. La aclimatación de los animales en las regiones elevadas // El progreso de México. 1896. № 4.

Herrera A. L. Recueil des lois de la biologie generale. México, 1897. P. I–XII, 1–146.

Herrera A.L., Vergara Lope D. Nouvelle théorie de ka respiration Hématose et osmose des gas dissouts. La respiration de la Tamise // Memoria de la Sociedad Científica A. Alzate. 1897–1898. № 11. P. 309.

Herrera A. L. & Vergara Lope D. La vie sur les hauts plateaux. Ciudad de Mexico, Imprenta de I. Escalante, 1899. 790 p. http://74.125.95.132/search?q=cache:naS8CtpaGmYJ:www.cesvbcs.gob.mx/cute/cutenewse/print.php%3Fid%3D1173305247%26archive%3D+Sociedad+Agron%C3%B3mica+de+M%C3%A9xico+%2B+Vavilov&hl=es&ct=clnk&cd=18&gl=mx&client=firefox- a (Accessed February 13, 2009).

Instituto Vir. www.vir.nw.ru/history/history.htm (Accessed January 2009).

Izquierdo J.J. Notas sobre las relaciones (1897–1968) entre los fisiólogos rusos y los mexicanos // Gaceta Médica de México. 1968. Vol. 98. № 9 (September). P. 1100–1108.

Jardín Botánicode Córdoba (Espa a). Cultivos marginados: otra perspectiva de 1492. Italia, FAO, 1992. 339 p. (Colección FAO, Producción y protección vegetal, № 26).

Kupzow Alexander J. Vavilov's Law of Homologous Series at the Fiftieth Anniversary of its Formulation // Economic Botany. 1975. Vol. 29 (October–December). P. 372–379.

La Redacción. Expedición botánica rusa, en la América Latina // México Forestal. 1925. Vol. 3. № 10. P. 147.

Loskutov Igor G. Vavilov and his Institute: a history of the world collection of plants genetics resources in Rusia. Rome: IPGRI, 1999.

Lysenko T.D. La Herencia y su Variabilidad. Translation to Spanish: Dobzhansky Th. Secretaría de Agricultura y Fomento. México, 1946. 78 p. (At least two other editions in Spanish exist., La Habana, 1947, 156 p.; & Ediciones en Lenguas Extranjeras, Moscow, 1951, 197 p.).

Malato-Beliz J. Lagasca y la Ley de las Series Homólogas de variación de Vavilov // Lagascalia. 1976. Vol. 6. № 2. P. 209–214.

Martínez Maximino. Los Recursos Forestales en las Regiones del Secano de México // México Forestal. 1926. Vol. 4. № 1–2. P. 1–10.

Martínez Maximino. Las plantas más útiles que existen en la república Mexicana. Ciudad de Mexico, Editorial Botas, 1928.

Mendel Cohen Barry. Nikolai Ivanovich Vavilov: his life and work. Thesis (Ph. D) Austin, University of Texas, 1980.

Moreno De Los Arcos Roberto. Las polémicas del darwinismo en México. Ciudad de Mexico, UNAM, 1984.

Ortega Martha; Godínez José Luis & Vilacrara Gloria. Relación histórica de los antecedentes y origen del Instituto de Biología de la Universidad Nacional Autónoma de México. Ciudad de Mexico, Instituto de Biología-UNAM, 1996.

Ortega Paczka R. La diversidad del maíz en México // Sin maíz no hay país / coords. G. Esteva, C. Marielle. Ciudad de México, CNCA/MNCP, 2003. P. 123–154.

Ortega Paczka R. Conservación in-situ de maíces nativos en México (2010, in process).

Popovsky Mark. The Vavilov Affair. Connecticut: Archon Books, 1984. 80 p.

Pringle Peter. The Murder of Nikolai Vavilov. The Story of Stalin's Persecution of One of the great Scientist of the Twentieth Century. New York: Simon and Schuster, 2008. 370 p.

Pruna P. El Caso Vavílov. La Habana: Cuba, 2010. 7 p. (Inédito)

Ruiz R. Positivismo y evolución: Introducción del darwinismo en México. Ciudad de México, UNAM, 1987.

Smith C.E. The New World Centers of Origin of Cultivated Plants and the Archaeological Evidence // Economic Botany. 1968. Vol. 22. P. 253–266.

The Origins of Agriculture and Crop Domestication / eds. A.B. Damania, J. Valkoun, G. Willcox & C.O. Qualset. ICARDA, Aleppo, Syria, 1998. xi + 345 p. (http://www.bioversityinternational.org/publications/Web_version/47/begin.htm#Contents) (Accessed: November 6, 2009).

Toledo Victor M., Barrera-Bassols Narciso. La memoria biocultural. La importancia ecológica de las sabidurías tradicionales. Barcelona: Icaria, 2008. 230 p.

Tort P. Para leer a Darwin. Madrid: Alianza Editorial, 2001.

Vavilov N.I. The Law of homologous series in variation // Journal of Genetics. 1922. Vol. 12. № 1.

Vavilov N.I. Estudios sobre el origen de las plantas cultivadas. Buenos Aires, Argentina: Ediciones ACME Agency, 1927. 185 p.

Vavilov N.I. Mexico and Central America as the principal centre of origin of cultivated plants of the New World // Bulletin of Applied Botany and Plant Breeding. 1931. Vol. 26. Leningrad. P. 179–199.

Vavilov N.I. The Problem of the Origin of the World's Agriculture in the Light of the Latest Investigations // Science at the Crossroads: Paper presented to the International Congress of the History of Science and Technology, London, June 29th to July 3rd, 1931. Frank Cass and Co., 1931.

Vavilov N.I. The process of evolution in cultivated plants // Proc. 6th Internat. Congr. Gen. 1932. Vol. 1. P. 331–342.

Vavilov N.I. Darwin on the Origin of Cultivated Plants. Session on Darwin, Soviet Academy of Sciences (28 de nov. de 1939), Moscow // Soviet Sciences. 1940. № 2. P. 55–75.

Vavilov N.I. Estudios sobre el origen de las plantas cultivadas. Buenos Aires: ACME, 1951. 185 p. (Translation to Spanish by Felipe Freier and Ovidio Nú ez, from the original in Russian-English published in: Bulletin of Applied Botany and Plant Breeding, XVI (2), Leningrad, 1926.)

Vavilov N.I. The Origin, Variation, Inmunity and Breeding of Cultivated Plants. Waltham, Mass. J., Chronica Botanica, 1951. 364 p.

Vavilov N.I. Origin and geography of cultivated plants. Cambridge: Cambridge University Press, 1992. 498 p.

Vavilov N.I. Five Continents / eds. L.E. Rodin, S. Reznik & P. Stapleton; transl. to English from Russian by Doris Löve. Rome, Italy: IPGRI, 1997. 198 p.

Vega Alfaro Eduardo De La. Del muro a la pantalla: S.M. Eisenstein y el arte pictórico mexicano. México: Universidad de Guadalajara, 1997.

Wellhausen E.J., Roberts L.M., Hernández X.E. With the collaboration of P.C. Mangelsdorf (1951) "Razas de Maíz en México, su origen, características y distribución" // Xolocotzia. Ciudad de México. 1987. P. 609–732.

Вавилов — советский дарвинист в Мексике

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Николай Иванович Вавилов приезжал в Мексику в 1930 и 1932 гг. В 1925 г. его команда посетила Мексику заранее, вступила в контакт с Альфонсо Л. Геррера и начала работать с Максимино Мартинесом, которого Дирекция биологических исследований назначила сопровождающим Советской научной комиссии. Исследовательская программа Вавилова о происхождении культурных растений мира продолжала проект Кандолле, который был пересмотрен Дарвином и пропагандировался в 1960-х и 1970-х гг. Джеком Р. Харланом и другими исследователями. Вавилов не смог довести свою программу до конца из-за препятствий, которые создавал Лысенко. Однако идеи Вавилова снова обрели популярность в Мексике. В настоящее время вавиловские концепции занимают важное место в дискуссиях о национальной пищевой политике и биокультурном наследии, которым является традиционная кукуруза и другие растительные ресурсы Южной/Центральной Мексики и Центральной Америки. Этот регион, также известный как Мезоамериканский гипоцентр подвергся опасности из-за экологической и пищевой угрозы, которую несет с собой внедрение генномодифицированной кукурузы.

Ключевые слова: Вавилов, Мексика, Мартинес, гипоцентр, культурные растения, генетика, этноботаника.

Stalin and Fighters Against Cellular Theory

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An illustrative example of the intervention of the Soviet totalitarian regime in science is the promotion of an old Bolshevik, Olga Lepeshinskaya, who declared that she proved the creation of new cells from non-cellular 'Living' :matter and insisted that the well-established Cell Theory should be rejected as erroneous. Although many leading biologists criticized her statements, Stalin personally supported her views and people like T. Lysenko enthusiastically agreed with these faibles. At the special session of two Soviet Academies – the USSR Academy of Sciences and the USSR Academy of Medical Sciences – Lepeshinskaya's claims were supported by 27 Soviet biologists who condemned the "bourgeois" science and many frauds presented fabricated 'evidence' in support of the "new Cell Theory". In 1950, by the special decree of the Soviet Government the Stalin Prize was given to Lepeshinskaya for her "discovery of Live Matter".The different governmental agencies ordered to forbid all research in the field of Cell Theory in the USSR. As a result, Russian science, that was at the forefront of world science in many fields, lost its reputation and is still suffering.

Key words: Soviet regime, cell theory, "live matter", Stalin Prize, Olga Lepeshinskaya, J. Stalin, T. Lysenko, G. Boshyan.

Iosif Stalin Personally Supports Trofim Lysenko in His Struggle Against Geneticists

In 1935, Lysenko twice gave presentations in the Kremlin in front of Stalin during meetings of the Soviet Government with collective farm peasants, and from the first meeting Lysenko played his role perfectly. He addressed to Stalin exactly such words that the latter wanted to hear:

> "Comrades, saboteurs and kulaks are to be found not only in your collective farm life. You know them very well in the collective farms. But they are no less harmful and no less a curse for science. Much blood has been spilt in various debates with these so-called "scientists" over the question of vernalization.
>
> The situation was such… that instead of helping the collective farms, they engaged in wrecking. In both the scientific world and the world outside science, a class enemy is always an enemy, whether he is a scientist or not.
>
> So, comrades, this is how we have dealt with things. The collective farm system has dealt with this. On the basis of a unique scientific methodology, and a unique scientific leadership, about which Comrade Stalin teaches us on a daily basis, this has been dealt with…" (Lysenko, 1935a)[1].

Stalin, filled with enthusiasm by the flowery speech of this "vernalizor," jumped up at the conclusion of Lysenko's speech and shouted to the hall: "Bravo, comrade Lysenko, bravo!" This outcry was published in all of the Soviet newspapers as a public declaration of Lysenko as the victor in scientific discussions.

But at the end of the 2nd World War Lysenko found himself under the strict criticism of many scientists and even some Soviet leaders. At this moment Stalin decided to support him.

[1] See also the brochure: Lysenko et al., 1935. P. 14–15.