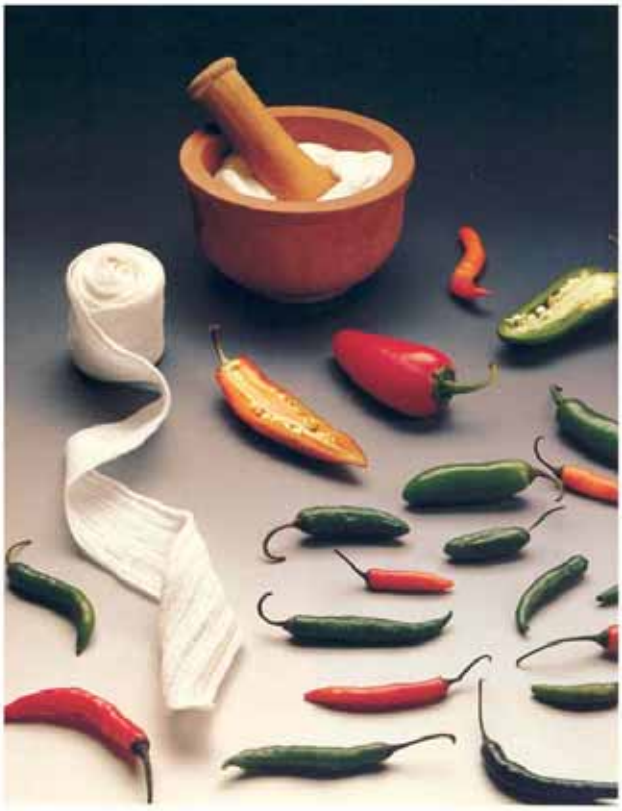
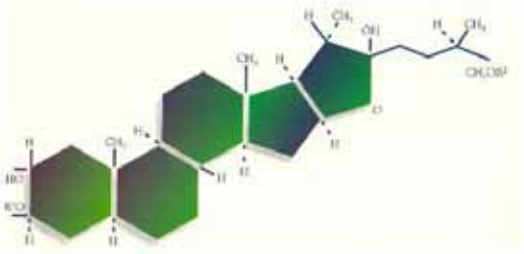
A few comments on the development of organic chemistry in Mexico[1]





Of the various subdisciplines in chemistry, organic chemistry is perhaps the most traditional and better established in Mexico. Indeed, as early as 1570 Felipe II commissioned Francisco Hernández to study the pharmacological properties of the Mexican flora. These studies were reported in the compendium *De historia plantarum novae hispaniae*, that would be complemented later by other illustrious botanists such as von Humboldt in 1820, Juan Maria Rodriguez in 1869 and Manuel de Esserart in 1883. Important natural products isolated during this period included *zoapatanol* (the active principle that induces labor in pregnant women) and *perezone,* whose interesting structural features and rich reactivity are still subject of study to this day.

These and related studies were the foundation of several chemical companies and laboratories (Laboratorio Quimico Central, Laboratorios Zapata, etc.) based on technology fully developed in Mexico. At the beginning of the 20th century, we also find several chemical companies in Mexico dedicated to the extraction and processing of vegetal oils, animal fat and soaps. Nevertheless, most of them were suffocated by the multiple difficulties and limitations that resulted as consequences of the Second World War.

Two fortunate coincidences gave rise to a rapid development of organic chemistry in Mexico in the 1940's: (i) the arrival of a most significant group of scientists fleeing the Franco regime in Spain, and (ii) the identification of steroidal components in native Mexican plants, and their

conversion to progesterone and other derivatives with great pharmacological importance.
Indeed, worldwide efforts directed to the production of the sexual hormones had culminated in the 1930s with a complex and highly costly procedure that involved extraction of chlolesterol from cattle brains followed by a complicated synthetic protocol. Based on ancient aztec texts, Russell Marker discovered *dioscoreae* plants in Mexico that contain large amounts of diosgenine, a substance that could be converted into progesterone via a brillant and relatively simple procedure. This knowledge was the basis of a highly successful hormone industry, exporting large quantities of progesterone (at US $50.00 per gram!) from the "Syntex" company to most parts of the world.

Most relevant, in 1945 the combined talents of Carl Djerassi, Jorge Rosenkranz, and Luis E. Miramontes resulted in the preparation of norethynyltestosterone, a powerful antiovulatory agent that became the active ingredient in "the pill", with revolutionary consequences in human health and behavior. Furthermore, in order to carry out the necessary research in the Mexican facilities, Syntex supported the creation of the Instituto de Quimica (Universidad Nacional Autynoma de México) and attracted a significant number of leading synthetic organic chemists, who subsequently influenced and trained several generations of Mexican organic chemists.
During the 1950's and 1970's Mexico was the first producer worldwide of steroidal materials such as progesterone, testosterone, estradiol, and cortisone. Nevertheless, the mainly pragmatic development and application of chemistry resulted in few professionals dedicating themselves to careers in chemical research. As a consequence, a relatively small number of Mexican academic institutions are dedicated towards chemistry education and research. Presently, only ca. 2000 students at University level go into chemical areas each year and only ca. 50 graduate students are granted doctoral degrees in chemistry.[4] Of these, nearly one half of the Ph.D. degrees are in the area of organic chemistry.

In this special issue of ARKIVOC dedicated to organic chemistry in Mexico, contributions from several representative academic research groups are collected. Until recently, most chemistry research was carried out in the metropolitan area (especially at the Facultad de Quimica and Instituto de Quimica, UNAM, Centro de Investigaciyn y de Estudios Avanzados, Cinvestav-IPN, and Universidad Autynoma Metropolitana), but new graduate programs have now been established at Universidad Autynoma de Puebla, Universidad de Guanajuato, Instituto Tecnolygico de Tijuana, Universidad Autynoma del Estado de Morelos, Universidad Autynoma del Estado de Hidalgo, and Escuela Nacional de Ciencias Biolygicas, ENCB-IPN.

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References

1. Main source: Juaristi, E.; Bucay, F. B.; Contreras Theurel, R.; Garcia-Colin Scherer, L.; Garritz Ruiz, A.; Giral Barnés, J.; Mateos Gymez, J.L.; Mendoza, M.E.; Miramontes C, L.E.; Padilla Olivares, J.; Quintero, L.; Santiesteban, F.; Tamariz Mascarúa, J.; Wofson, I. *Ciencia* **2001**, *52*, 84.
2. Instituto Politécnico Nacional.
3. Universidad Nacional Autynoma de México.
4. By comparison, nearly 2000 doctoral degrees in chemistry are granted each year in the US, and ca. 400 in Spain.

