ority even though the title-page of the volume in which it appears is dated 1789, since the particular part in which the name appears was not published until 1792. An older epithet, *lontaroides*, must now be taken up and the correct name for the red latan becomes *Latania lontaroides*.

The genus *Latania* was described by Commerson in Jussieu's *Genera Plantarum*, a book published on August 4, 1789. No species was named however. Later, within a period of two years, *Latania borbonica*, *Latania Commersonii* and *Cleophora lontaroides* were proposed for the one species then known. *Cleophora* is a direct nomenclatural synonym of *Latania* and the epithet *lontaroides* now clearly has priority. In the following synonymy, the more precise dates for pages and parts are followed in parentheses by dates which appear on the title-pages of the volume when these differ.

Latania lontaroides (J. Gaertner) H. E. Moore, **tr. nov.**

Cleophora lontaroides J. Gaertner, De Fructibus et Seminibus Plantarum 2 (2) : 185. April-May 1791.

Latania borbonica Lamarck, Encyclopédie Méthodique, Botanique 3 (2): 427. 13 February 1792 ('1789').

Latania Commersonii Gmelin in Linnaeus, Systema Naturae, ed. 13, 2 (2): 1035. April-Oct. 1792 ('1791').

Latania rubra N. J. Jacquin, Fragmenta Botanica 13. 1801 ('1800-1809').

H. E. MOORE, JR.

Palm Chromosomes*

ROBERT W. READ
Botanist, Fairchild Tropical Garden, Miami, Florida

Each and every cell of palms, as in all except the lowest organisms, contains chromosomes, which appear as microscopic rod-shaped structures at the time of cell division. These tiny rod-shaped bodies are the bearers of the genes, which control hereditary characteristics. That is to say, the units of heredity, which control the ultimate size, shape and color of palms, are borne within the body of the chromosomes. The number of chromosomes is usually constant for any given species and in the palm family it is usually constant for each genus. In cells which are not undergoing division, the chromosomes are enclosed within a spherical structure known as the cell nucleus. Chromosomes are often studied during the process of cell division when an individual cell divides into two new daughter cells. During cell division the membrane surrounding the nucleus disappears and the chromosomes round up into their characteristic shapes. Each chromosome has already reproduced itself and the new chromosome halves separate, one half to each of the two daughter nuclei. A wall then forms separating the two new nuclei into two new cells both having identical complements of chromosomes. This process continues in the growing portions of plants as long as they are alive and growing.

There are also places other than the growing points where chromosomes may be observed. One of these is in the pollen

*An informal report based on a study of the cytology of palms, which is presently being supported by the National Science Foundation as part of Grant G-18770. The cytological research is being carried out at the Fairchild Tropical Garden by R. W. Read under the direction of Dr. H. E. Moore, Jr. of the L. H. Bailey Hortorium and Dr. C. Uhl, Department of Botany, Cornell University, Ithaca, N. Y.

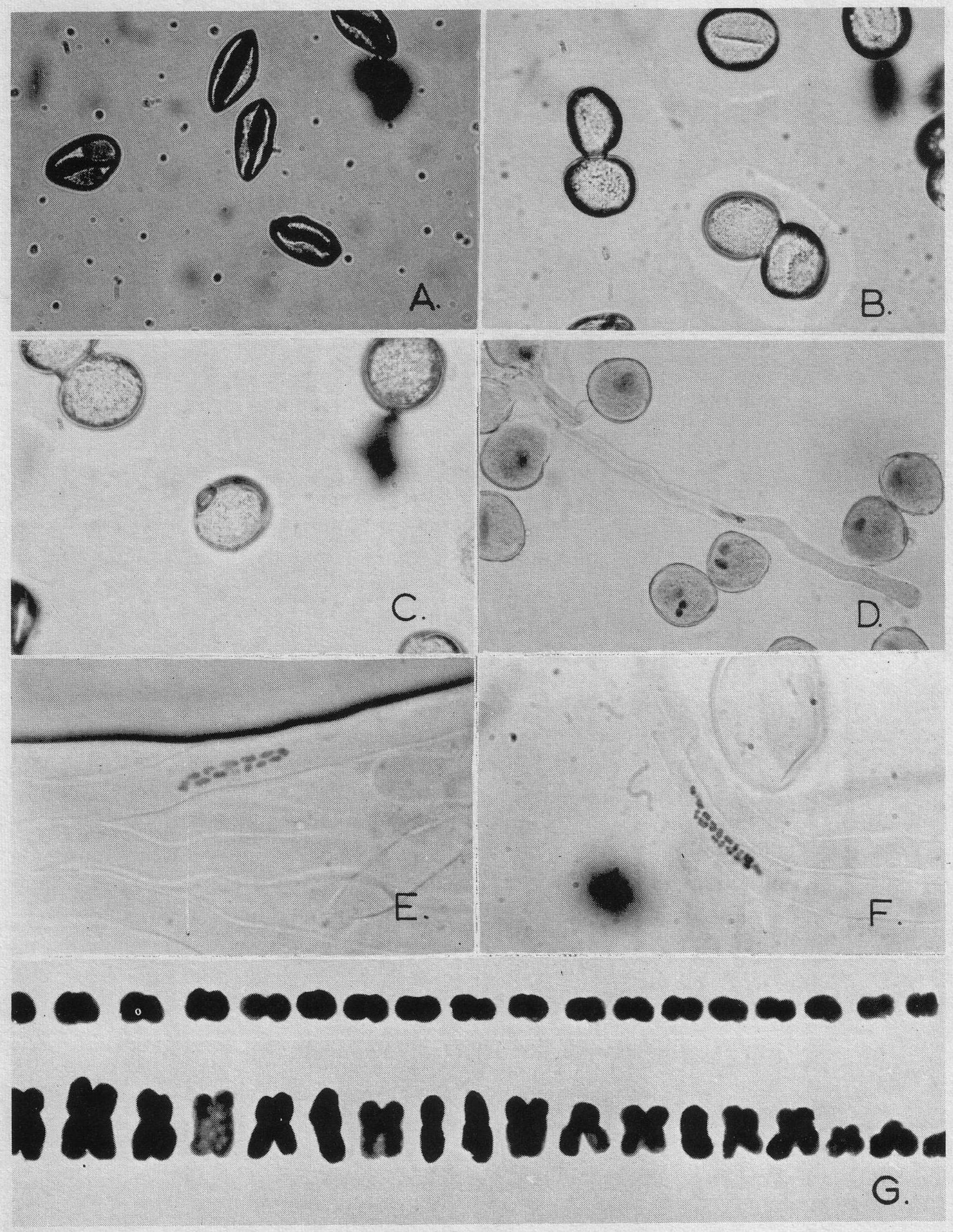
tube after the pollen grains germinate. In order for normal fertilization to be effected and for seed to be produced, it is necessary for pollen from male flower parts (anthers) to germinate on a receptive female flower part (the stigma). When a pollen grain germinates on the stigma of a palm flower, a pollen tube is produced which grows down through the style and into the ovary bearing the sperm from the pollen grain to the ovule and fertilizing the egg therein. Within the pollen grain of palms there are normally two nuclei, one of which (the generative nucleus) undergoes a division into two smaller nuclei which are called sperm nuclei. At this stage, referred to as mitosis of the generative nucleus, or pollen tube mitosis, the chromosomes are readily stained and may be observed with a high power microscope.

Rather than attempt to isolate and study pollen which has germinated and produced tubes in the female flower parts (the stigma and style), it has been found simpler to sow pollen grains, as one would sow orchid seed, on a nutrient material in a moist environment and to study the pollen tubes as they germinate. Conditions of heat, moisture and nutrients must be exactly right or the pollen will not germinate properly. After the pollen is sown and germination occurs, a pollen tube is developed within which the chromosomes of the generative nucleus become distinct, each one having become doubled. In the present work, colchicine is being used to prevent the chromosome pairs from separating. (Colchicine is also commonly used to induce polyploidy, but it is used here only to slow down the division of the generative nucleus.) Without the use of colchicine the chromosome pairs would separate and rapidly form into the two new (sperm) nuclei. Colchicine arrests the chromosomes at the stage most favorable for study.

The cover is a photomicrograph of *Thrinax floridana* (n=18) chromosomes enlarged approximately 7,000 times. The chromosomes are shown within the germinating pollen grain.

Their actual sizes range from about 1 micron to 2.9 microns in length. In this cell all chromosomes could not be photographed clearly at the same plane of focus. To see more clearly the range in size and shape of palm chromosomes, and for comparative studies, an enlargement of a photomicrograph is made, the individual chromosome figures are cut out, and the figures of the chromosomes are then glued in line according to size and shape (Fig. 61G).

Thus far in the study of palm chromosomes it has been found that certain palm genera (*Sabal, Nannorrhops, Serenoa, Copernicia, Paurotis,* etc.) have very tiny chromosomes (0.5 microns to 1 micron in length) whereas other genera, e.g., *Rhapidophyllum, Trithrinax, Cryosophila* and *Chamaerops,* have chromosomes which are conspicuously larger (1 micron to 3.5 microns long). By studying such characteristics as size and shape of the chromosomes in different species and genera of palms, in much the same manner as leaves, flowers, and fruits are studied, we may be able to understand something more concerning the relationships of palm genera or groups of genera to one another. For example, the size range of the chromosomes in *Paurotis, Copernicia* and *Erythea* may serve, along with floral and fruit characters, to suggest that these genera are more closely related to each other than to other genera possessing larger chromosomes. On the other hand, *Trithrinax* and *Cryosophila* have the largest chromosomes observed dur-



61. Palm chromosomes. A, B, C, D, Polaroid photomicrographs illustrating the process of pollen grain germination of *Coccothrinax argentata* upon a nutrient medium, enlarged approximately 1,000 times. A, freshly sown pollen; B, ten minutes later, as moisture is imbibed; C, one hour later as germination proceeds; D, fully mature pollen tube containing group of chromosomes. E, F, photomicrographs of chromosomes within pollen tubes, enlarged approximately 1,500 times. *E, Chamaedorea Ernesti-Augusti*, 13 chromosomes; F, *Thrinax microcarpa*, 18 chromosomes, one not clearly in focus. G, photographs of chromosomes cut out and arranged according to size for comparative studies. *Thrinax excelsa* above, *Trithrinax brasiliensis* below.

ing the present study. The large size and general similarity of these chromosomes suggest a close relationship. However, differences in shapes of individual chromosomes suggest that the genera are nonetheless distinct.

Introduction of Palms in the U.S.S.R.

S. G. Saakov

Botanical Institute of the Academy of Sciences of the USSR, Leningrad

The main regions of cultivation of subtropical plants (including palms) in the Soviet Union are the Black Sea coast of the Caucasus from Sochi to Batumi and the south coast of Crimea, where the first attempt to cultivate palms in the open in Russia was made near Yalta in 1814 at the Nikitsky Botanic Garden.

According to the 1818 records of H. Steven, the first director of the garden, *Chamaerops humilis* grew well in the open, and since 1824 it has spread along the south coast of Crimea at Gurzuf, Alupka, Sudak and some other places. Other early introductions at Yalta were *Phoenix* sp. (1824) and *Trachycarpus Fortunei* (1860) which began to ripen fruits in the open in 1881 (though thousands of young plants had been obtained earlier by cutting infloresences and ripening them indoors). *Erythea armata* was introduced in 1910 and *Washingtonia filifera* in 1913, both from Sukhumi. *Phoenix canariensis* and *Butia capitata (Cocos australis)* have also also been grown in the Crimea.

A very cold winter in 1910-1911 had 33 days of uninterrupted frost and minimum temperatures down to –12.5° C. (9.5° F.) (air) and –13.6° C. (7.7° F.) (soil). During this winter, *Chamaerops humilis, Trachycarpus Fortunei, Butia capitata, Jubaea chilensis, Latania lontaroides (L. Commersonii)*, and *Phoenix canariensis* endured frost of –7° C. (19.4° F.) without injury. At –11° C. (12.2° F.), *Trachycarpus* leaves were damaged; at –13° C. (8.6° F.) all species suffered leaf damage and *Butia, Jubaea*, and *Latania* were killed. In another cold winter (1928-1929), *Chamaerops* was severely damaged by –14° C. (6.8° F.) temperatures and did not flower again in four subsequent years though by 1934 most plants again flowered. The winter of 1949-1950 was exceptionally cold at the Nikitsky Botanic Garden with 35 frosty days and temperatures to –17° C. (1.4° F.). The palms were severely damaged though some plants of *Chamaerops, Sabal minor, Trachycarpus Fortunei, T. Martianus, T. Takil* and *Phoenix canariensis* managed to survive. The cultivation of the above species in the open in Crimea is only the beginning. Results suggest that more and more new species should be tested.

Black Sea Region

Among the localities of the Black Sea coast of the Caucasus, Sukhumi holds the first place in the diversity of palms, followed by Batumi, Sochi, Gagra and Poti. The time of the appearance of the first palms in the southeastern part of the Black Sea coast can be established but approximately. The first work on the introduction of subtropical plants was started at Sukhumi in the thirties of the Nineteenth Century and was intensified with the foundation of the Sukhumi Botanic Garden in 1840. Many plants were destroyed during the Russo-Turkish war of 1877-1878 so that new plants in the parks were planted after 1878.

Vvedensky reported that in 1899, the