ovary along with the horns was uniform; the tender horns were concealed within the perianth. There was no marked difference in the size and shape of this abnormal flower with that of normal ones. On removal of the perianth, the horns were visible. The horns varied from 3 to 6 and were seen to develop as a result of the enlargement of the staminodes. The pattern of horn production in some fruits of one of the palms is given in Table I.

Anatomical studies of young fruits revealed that adjacent horns get united in pairs or in threes along the linear margins, wholly or partially upto the tips even at an early stage of development. After fertilization, the ovary registers a faster growth dwarfing the horns. The few horns that develop with the speed of the carpels possess some structure similar to the stigmatic surface at their tips. The horns grow for seven or eight months only and cover most of the ovary excepting the stigmatic end. The developed horns usually number three in a fruit and look flat or solid, varying in size and shape (generally boat-like). They curve towards the stigmatic end and may or may not bifurcate at the tip. The maximum length of a horn is 26.5 cm with a thickness of about 4.0 cm at the middle. The perianth lobes in every fruit remain distinct from the horn-like structures.

The development of horns in these fruits support the theory based on the enlargement of staminodes. Here, the nuts are normal, having kernel and nut-water, and capable of germinating as usual. Some seedlings raised from these nuts have been planted and are under observation.

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On the occurrence of Pistillate and Neutral Flowers in Cashew*

Cashew (*Anacardium occidentale* L., Anacardiaceae) normally produces male and hermaphrodite flowers in the same terminal panicle. A normal cashew flower consists of 5 sepals, 5 petals, 6-10 stamens (of which one is large and functional and 5-9 are small and sterile), and a single ovary (rudimentary in the case of male flowers) (Figs. 1, 2, 3, and 4).

While studying the floral biology of cashew, we noticed some flowers with abnormal flower parts. A single flower contained upto three large fertile stamens in addition to 6-10 small stamens. In some male and hermaphrodite flowers, the fertile

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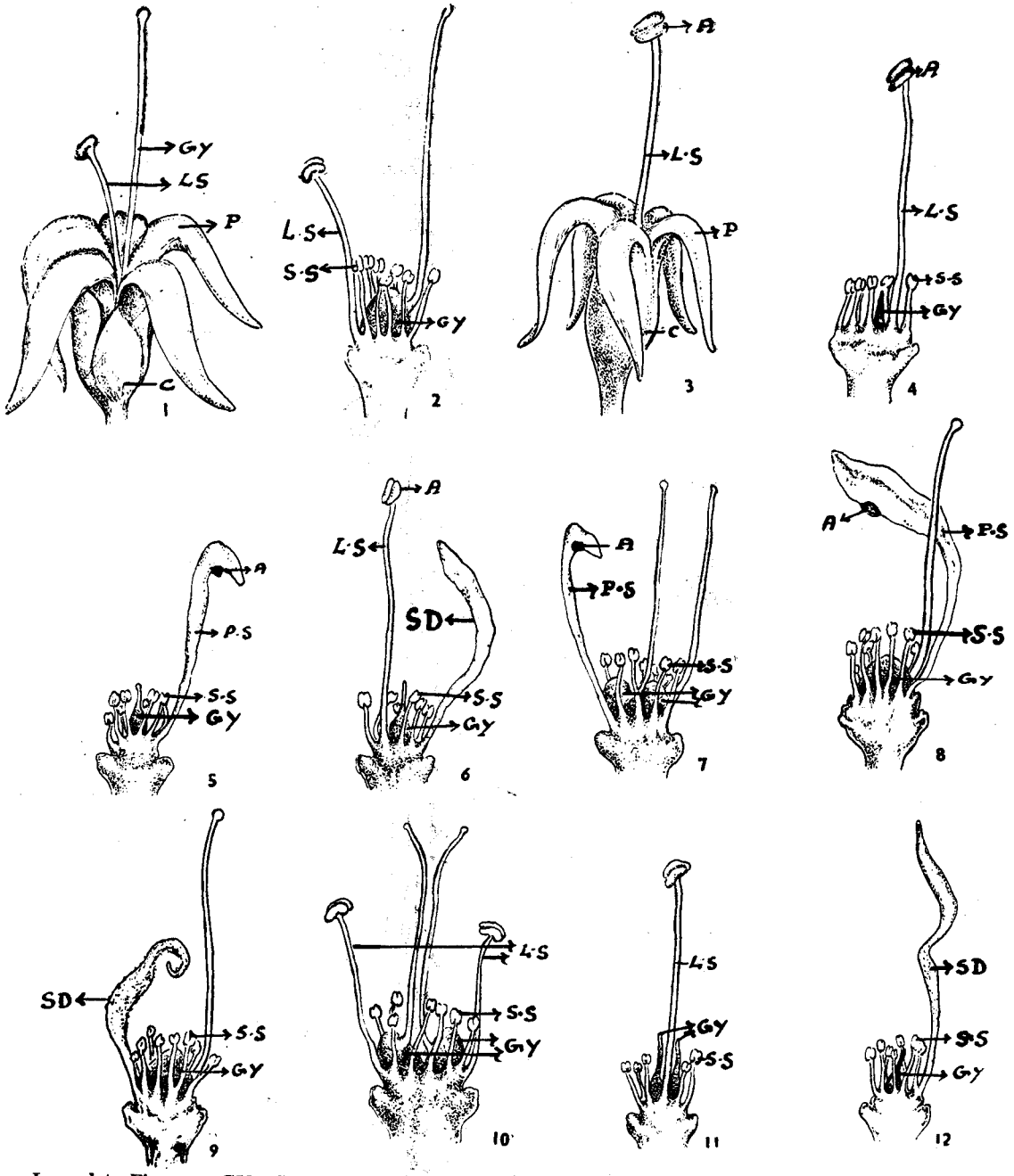

Legend to Figures: GY = Gynoecium. LS = Large stamen. P = Petal. C = Calyx. SS = Sterile stamen. A = Anther. PS = Petaloid stamen. SD = Staminode.

Figs. 1. Hermaphrodite flower. 2. Hermaphrodite flower with andorecium and gynoecium. 3. Male flower. 4. Male flower with androecium and rudimentary carpel. 5. Male flower with petaloid stamen. 6. Male flower with a staminode. 7. Hermaphrodite flower with two carpels and a petaloid stamen. 8. Hermaphrodite flower with a petaloid stamen. 9. Pistillate flower. 10. Hermaphrodite flower with two carpels and with two stamens. 11. Male flower with two rudimentary carpels. 12. Neutral flower.

stamen was modified into a petaloid form with only one functional pollen sac (Figs. 5, 7, and 8). In a few others, this functional pollen sac was missing from the petaloid stamens (Figs. 9 and 12). Abnormal male flowers with two rudimentary carpels (Fig. 11) and hermaphrodite flowers with two carpels fused at the base were also noticed (Figs. 7 and 10).

The petaloid stamen with only one functional pollen sac as in *Canna edulis* may be visualised as an intermediary stage between bisexual and pistillate flowers or even male and neutral flowers. Thus, complete male sterility in male flowers leads to neutral flowers and in hermaphrodite flowers to pistillate flowers. Correns (1928) has proposed that the unisexual flowers of the polygamous species of angiosperms derived phylogenetically from bisexual forms by loss of function, reduction, or disappearance of androecium or gynoecium. Ascenso and Mota (1972) suggested the origin and evolution of male flowers in cashew from the ancestral bisexual flower by a gradual reduction in the size of the carpel. The presence of broad laminar structure undifferentiaated into filament and connective, and prolonged beyond the sporangia is the characteristic feature of a primitive stamen (Takhtajan, 1969). The origin of laminar stamen in cashew may then be a retrogressive step. However, Eames (1961) has considered such changes as simplicity rather than primitiveness.

Ascenso and Mota (1972) suggested that it would be interesting to survey the cashew populations in South American areas of diversity to detect the presence of pistillate flowers. The observations recorded here have revealed that there are pistillate and neutral flowers in cashew, and also intermediary stages with one anther sac with much less frequency.

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