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INTER-RELATIONSHIP BETWEEN CERTAIN UNFAMILIAR ANIMALS AND PLANTS

T. A. DAVIS

Haldane Research Centre, Nagercoil-4, Tamilnadu

ABSTRACT

Living in an environment totally devoid of green vegetation, man turns crazy as is often experienced by scientists who have to live in the white wilderness of the Arctic ice-cap. They create artificial cardboard conifers to soothen the famished eye. A few examples of special relationship between animals and plants are given below. For the baya weaverbird *(Ploceus philippinus)*, green strands of leaf blades at the nest is a sign of industriousness, and males who can weave efficient nests get many mates during one season. For the aboriginee women of Irian Jaya, the bark of *Cinnamomum kami* is a defense against their brutal husband. When harassed, they threaten to eat kami and become sexually sterile, not capable of producing a male issue who is the pride and support for the father at his old age. The male deer-pig *(Babirussa babirussa)* always sharpens his tusk on the butress-roots of *Canarium* sp. Where such buttressed trees are felled or not available, the animal migrates to another region. The malleefowl *(Leipoa ocellata)* piles leaves and brambles over its large, 10-m wide nest. With rains, the organic materials liberate heat enough to hatch the eggs of the fowl that doesn't brood over the eggs. At the reclaimed land of the Sumatra swamps, where the natural ecosystem is disturbed by coconut plantations, rare crustacean and mammalian pests start ravanging the coconut. Small-holders grow pineapple, tapioca, banana and yams at the borders of gardens established in forest areas for these pests to get satiated with their produce and spare the coconut. Man endeavours to improve the dry and parched soil to raise a green coconut canopy by difficult means. He even converts the marshy swamps by providing suitable drainage system into a land suitable for raising crop plants. Man is also capable of replacing an uneconomic crop in favour of an attractive one, thus going upto the extent of clearing mountains of coconuts in favour of more paying crops like the clove. The largest flower *(Rafflesia arnoldi)* and the gigantic arum *(Amorphophallus titanum)* emit odour unbearable for human being in order to attract pollinating agents. Coconut trichomes serve as poison to insect pests like *Setora nitens* and *Chalcoscelids* sp. Particularly in South India, people are causing the rapid disappearance of the "karpaka vriksham", *(Borassus flabellifer)*, the hope for people of dry regions. The coconut crab *(Birgus latro)* is alleged to subsist mostly on coconut and hence its popular name. However, thus has recently been proved to be untrue since the crab can live without coconut. The painted stork carries green twigs to its nest having chicks. Do these twigs protect the chicks from diseases, pests or excessive heat ? The common crow, *Corvus splendens* is an example for an animal that reduces its dependence on plants. It switches over to metal nests in place of the traditional nest made of twigs and brambles.

INTRODUCTION

Interdependence of plants and animals, especially of the latter for the former, is the way of life. In the total absence of plants that produces the vital oxygen, animal life on earth can not be viable even

for more than five minutes. Such is the dependence of animals on plants which also supply the needed food, shelter and other requirements for the animal world. Plants too depend on animals in innumerable ways. Man, the most evolved animal, can destroy nature, but at the same time is capable of developing a congenial ecosystem, raise useful plants and multiply them when he has the need for such plants. In this communication, I present a few examples of how certain unfamiliar animals demonstrate their extreme dependence on plants.

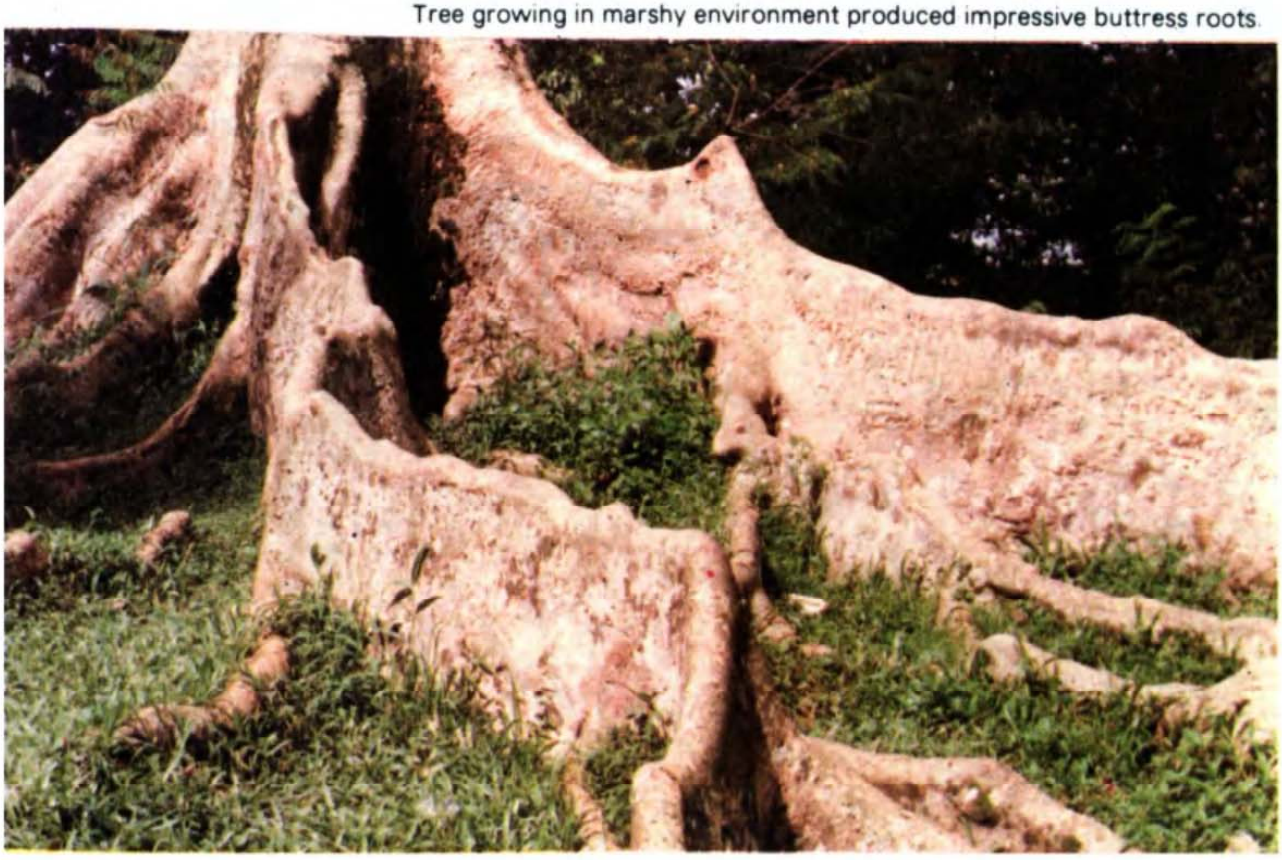
1. *Longing for a green leaf at the Arctic circle:* In early 1973, I had a trip to the Arctic Circle as the guest of the Arctic Naval Research Laboratory of the U.S. Navy at Point Barrow, the northern landsend for USA in Alaska. Within three days of my arrival there where I saw nothing but vaste stretches of white snow and ice I felt very depressed. Seeing the change in me, a colleague at the Laboratory offered to take me to their national park. Overwhelmed at the prospect of seeing some green plants, I couldn't realise that no plant can grow on the Arctic ice-cap. When we reached a place near Point Barrow, I was told that we reached the national forest where I was surprised and disappointed to see a large hard board cutout and painted green to resemble a conifer. This 'forest' represents a true green park for the casual inhabitants of the Naval Laboratory. I became pensive for some time contemplating on how people here long to see a green blade while in the tropics we destroy green nature ruthlessly. Even very precious and rare plants at the Botanic Garden at Howrah used to be cut and destroyed for the meanest purpose of using as fire wood in the kitchen.

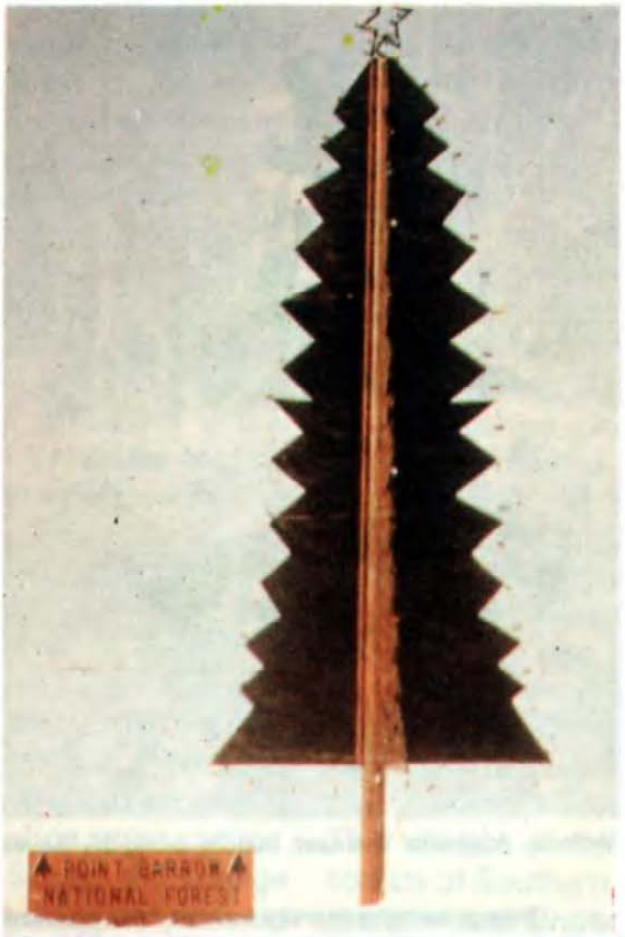
2. *Role of leaves for the giant nest-mounds of megapode:* Family Megapodiidae comprises only 12 or 13 species of birds which are popularly called the thermometer birds. As their name suggests, they have powerful feet with which they either dig pits to lay their eggs or gather large quantities of organic matter and pile them into a huge mound. One of the species distributed in Southern Australia (Victoria) known as mallee-fowl *(Leipoa ocellata)* makes the largest mound, about 10 m across and 4 m high. Such mounds of dry leaves of mallee vegetation (mostly of low *Eucalyptus)* are gathered and heaped during dry months. When they get soaked in rain water, the leafy material ferments raising the temperature. When the temperature is just enough for the eggs to hatch without the bird having to brood over, the hen lays her egg in a hole made at the zenith of the mound. The bird has the faculty to assess the temperature of the nest with its tongue. Hence the megapode has earned its name, thermometer bird. This species prefers to live in the mallee forests of Southern Australia due to certain preferences. Under such an environment, the bird can have successful nesting only with the shed leaves.

3. *Buttress roots of Canarium for sharpening the tusk of Babirussa:* The deer pig *(Babirussa babirussa)* is endemic to the Sulawesi Island of Indonesia. This non-aggressive pig looks ferocious because of the four canines that develop very prominently in the male. The two canines on the upper jaw grow upwards, pierce the nasal skin and arch backwards at the forehead. The lower canines grow outward and eventually turning backward into powerful structures capable of tearing an adversary. The male pig often sharpens the tusks on buttresses of trees. *Canarium* trees have such convenient buttresses. *Babirussa* inhabits such forest areas that abound in *Canarium*. In forests where there is no buttress stem or buttress-rooted plants, this animal can not be found. They are also said to leave a forest area where buttress trees are felled. Thus, there is an

Nest-mound of mallee-fowl in Victoria, Australia. The nest, built by piling dry leaves and soil, may measure upto 10 m across.

Tree growing in marshy environment produced impressive buttress roots.





An artificial tree in the Arctic Circle which represents the National park of Point Barrow, Alaska.

A coconut garden is being established in a dry and unsuitable area near Madurai, Tamilnadu by providing irrigation.

The face of Sulawesi deer-pig *(Babirussa babirussa)* showing the four canines.

The palmyra palm *(Borassus flabellifer)* having been severely defoliated.

View of a young coconut seedling in a swampy area defoliated by a mud crab *Neoepisesarma* sp.

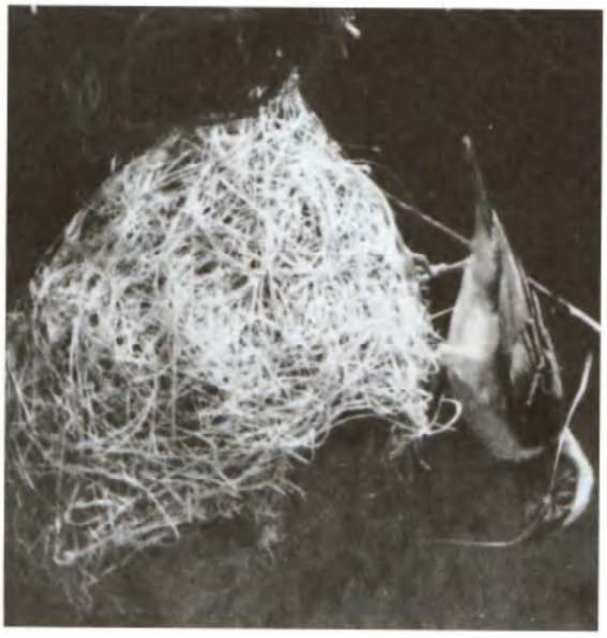
interesting interaction between deer pig and canarium trees.

4. *The baya weaverbird and the nest it weaves with leaf strands:* The Asiatic baya weaverbird *(Ploceus philippinus)* is famous for its retort-shaped, dangling nest woven with strands of grass blades and palm leaflets. It is the male that builds the nest, and the female, though not capable of weaving a nest, seems to be a good critic in selecting a strong and suitable nest for her use. The hanging nest at the 'helmet' stage has two entrances at the bottom, separated by a bridge. New leaf fibres are added on to the lower open portion of the nest. The male baya will not complete a nest unless he entices a female to be his mate. Thus, in order to attract a female, he brings new stands of leaf every day and weaves them at the mouth of the openings. These strands dry and turn brown on the next day. Hence, the male again brings fresh green fibre and convinces a prospective female that he is very industrious to be able to win her as his mate. If the male continues to be active in bringing fresh fibre daily and if the nest he weaves is strong enough, he would win soon a female to be his mate. But many clumsy and lazy builders remain bachelors throughout the breeding season since the females are not attracted by inefficient and non-elegant nests. Efficient builders get more than one female each season, and they build multi-storeyed nests, one below another, sometimes upto six nests in a vertical chain.

5. *Association between coconut palm and the coconut crab (Birgus latro):* Throughout the Pacific Is., Indonesia and as far west as the South Sentinel Is. of the Andaman group of Is., the giant coconut crab *(Birgus latro)* is distributed. It is reported that this largest shore crab can only co-exist with coconut as it is alleged that the crab climbs a palm, plucks a nut, removes its husk, breaks the shell, drinks the water, eats the kernel and climbs down like a thief. That is why the crab is known as robber crab. Coconut crab has an intimate association with coconut and lives on coconut kernel. The fat at its

Incomplete nests of baya weaverbird *(Ploceus philippinus).*

The male baya is building the lower nest with a leaf strand.



tail is also reported to taste like coconut oil because of the coconut-eating habit. We made two expeditions to South Sentinel Island (which is uninhabited by man) where we saw the husk of many coconut fruits peeled strand by strand by the crab to reach the nut. Breaking the nut through the soft eye is relatively easy for the powerful pincers of the crab. We have no doubt that such dehusking and breaking open of coconuts were the acts of *Birgus latro*. However, the crab can also subsist on a variety of food material.

6. *Environmental change leads to special plant-animal interaction:* Along the tidal swamps of Sumatra, especially in Riau and Jambi Provinces, extensive water-logged and mangrove-nipa forests have been reclaimed recently and planted with coconut and other crop plants. As most of these reclaimed areas lie adjoining virgin forests, some wild animals like wild boar, tree bear and species of monkeys are particularly attracted to the new crops that have come to their neighbourhood. Coconut seedlings are severely damaged by wild boar; the growing point of young palms are chewed by the bear and young fruits; and buttons were seriously damaged by monkeys. Indonesians who implicitly practice "pancha shila" have adopted the following strategy to protect their coconut palms without having to destroy the mammalian pests. Along the borders of coconut estates, wide areas are planted with banana, pineapple, tapioca, yams and sweet potato. These crops are the "offerings" for the unusual pests. The wild boar gets satiated with tuberous roots of yams and topioca while the monkeys and bears have plenty

Baya colony on telegraph lines. Some nests are multi-storeyed

of banana and pineapple to consume, and so, coconut is no more attractive to them.

Coconut gets a new crustacean pest in some parts of these reclaimed tidal swamps of Kalimantan. A small tidal crab, *Neoepisesarma* sp. that was living amidst mangroves and other swampy vegetation and living on the small animals that survive in the environment are fully deprived of their usual food. Thus, in the reclaimed areas planted with coconut seedlings, they start living on the lamina of young coconut

7. *Man's interaction with plants — positive:* The most evolved animal species, *Home sapiens,* is often accused for causing destruction to nature, and environment pollution. But here is an example of how man is also capable of creating a better environment out of very much neglected and good-for-nothing, barren land. When the coconut palm gave the promise of a lucrative crop, many enlightened and well-to-do people went into coconut farming in South India. Especially in Tamilnadu where the land is not very fertile, and rainfall very low for coconut, many small coconut gardens are being raised by digging deep wells and irrigating the seedlings regularly. Many of these gardens have proved very successful and paying. Thus, man deliberately helps increasing plant communities and productivity.

8. *Destruction to palmyra palm (Borassus flabellifer):* The palmyra palm with its over 300 uses for man, is on the road to extinction in South India. India grows about 50 million palmyras mostly in Tamilnadu and Andhra Pradesh. Palmyra stem and crown are extensively being used in brick kilns. Dicot firewood is more expensive. Hence, even young palmyras are being cut and destroyed. Especially in the semi-arid districts, palmyra is the only hardy tree that maintains the greenness of the

Coconut robber crab *(Birgus latro)* about to consume coconut kernel The fruit was split open by man

area. By cutting away these palms, the ecology is disturbed and would affect adversely even the low rainfall. Even where the palms are not felled for firewood, in many places, the crown is ruthlessly defoliated. The leaf stalk yields three kinds of fibre and the mature leaf is used for thatching roofs and for making mats and baskets. But the damage is more serious where the very tender leaves (before they turn green) are chopped off for making hats, mats, baskets and other fancy articles. These partially or fully defoliated palms are more susceptible to drought and they wither away during dry months.

9. *Bouquet of green leaves for the chicks of painted stork.* There are many natural bird sanctuaries in South India where migratory birds such as the painted stork, pelican and others frequent for breeding. When the nesting habits of the painted stork *(Ibis leucocephalus)* were studied, we could observe a strange behaviour. The parents, especially the male stork brings thorny, dry twigs for building a large flat nest periodically even after the normal clutch of eggs has been laid. But at a later stage when the fledglings are 2-3 weeks old, the parents bring green twigs with fresh leaves of margosa, drumstick and a few other trees. These leafy shoots are placed amidst the young. The significance of bringing these leaves is not known. Whether the parents provide a soft bed of leaves for the young, or the leaves are supposed to ward of pests and diseases or whether they are meant to be consumed by the young as a preventive medicine is not clear. Such an interaction between the painted stork and green leaves is worth investigation.

10. *Leaves resistant and susceptible to insect pests:* There are innumerable references to leaf-insect interactions. I wish to mention just one case of a slug caterpillar, *Setora nitens* that lives on coconut lamina. In a coconut hybrid seed garden, both the tall and dwarf variety palms were planted side by side in a large field in Indonesia. It was noticed that the tall variety palms were severely infested by *Setora* larvae while the dwarf variety palm was only sparingly infested. While studying the reason for such a difference in the incidence of the insect pest, we found that the dwarf variety possessed a higher density of the protective epidermal outgrowths or trichomes than the tall variety. Therefore, the insects, realising the existence of such a barrier in the dwarf form, automatically concentrate on the tall variety palms.