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WILD PLANT ACCEPTABILITY TO A CAPTIVE COSTA RICAN BAIRD'S TAPIR

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ABSTRACT

A captive adult male Baird's tapir (*Tapirus bairdii*) was offered the foliage of 381 species of plants native to tapir habitat in Guanacaste Province, Costa Rica. It absolutely rejected 55 percent, unambiguously accepted 29 percent, and ambiguosly treated the remaining 16 percent. While it did consume many species of foliage, it certainly was not indiscriminate in food choice. Sets of closely related species contained both strongly rejected and eagerly eaten species. Of 55 species of tree and shrub legumes, the foliage of only one (*Pterocarpus rohrii*) was eaten, while many species of herbaceous legumes (vines and self-supporting plants) were eaten. The foliage of many species of fast-growing early succession trees was eaten but that of many other species rejected (e. g., *Trema micrantha, Bursera simaruba, Carica papaya*). Some very aromatic plants were eaten eagerly, but spiny plants and hot fruits *(Capsicum)* were rejected. Foliage of garden plants was generally much more acceptable than that of wild closely related species. Even the foliage of favored species was eaten in quantities per meal far less than the stomach capacity of the tapir, and once "full" of one favored species, the tapir would then eat its fill of other favored species. The tapir's most eagerly sought foods were banana fruits (*Musa sapientum*) and the fruit pulp (endocarp) of guapinol (*Hymenaea courbaril).*

Baird's tapir (*Tapirus bairdii*) is the largest extant native herbivore in Central America. Prior to recent habitat destruction and hunting with guns, tapirs ranged throughout all Costa Rican forested habitat types. Tapirs eat a large variety of plant parts of many plant species (Terwilliger 1978). Here I record the results of offering a single captive adult tapir several hundred species of foliage and a lesser number of fruits that occur in Costa Rican deciduous forest habitats presently occupied by tapirs.

Materials and Methods

The adult male tapir was born in late 1970 in the montane forest on Volcán Orosi, Quebrada Grande de Liberia, Guanacaste Province, Costa Rica. He was captured (January 1971) while still heavily spotted and at this age drank milk readily from a bowl or baby bottle. He became a household pet at Finca la Pacífica, 7 km north of Cañas. For about two years he ranged free, feeding on table scraps and wild plants in the secondary successional forest around the main ranch house. In 1973 he was placed in a 20 x 20 m dirt-floored corral where he remained until he died, apparently of a respiratory disease, in mid-August 1978. The corral always contained a running water stream, and contained a concrete pool from 1976 to 1978. While in the corral, he was fed in the early morning and late afternoon. Food was usually a mix of mangos, bananas, citrus, cooked rice, table sraps and miscellaneous fruits plus a pile of cut weeds. Balsa (*Ochroma pyramidale*) and guacimo (*Guazuma ulmifolia*) trees overhead dropped readily-eaten leaves into the corral.

The tapir was heavily infested with ticks and these were removed with commercial acaricides once or twice a year. He occasionally got a fungal hoof disease that was common on local horses. This was cured with the same medicines that were used on the horses. Other than these minor ailments, the tapir was in good health during all feeding trials, ate readily every day, and showed no signs of malnourishment. He seemed content with confinement in the corral and did not display pacing or other neuroses common in caged animals. There was no suspicion that his feeding preferences were indirectly influenced by confinement. Throughout the feeding trials, he weighed about 200 kg.

The feeding data were obtained between November 1976 and early August, 1978. I report it now because it is very unlikely that another captive adult tapir will be available soon for feeding trials in close proximity to Costa Rican tapir habitat. There is only one other captive adult tapir in Costa Rica. He is in the National Zoo in San José. Use of this animal for further feeding tests will require a longistic operation of a magnitude beyond my present resources.

With the exception of a few cultivated plants, the plants offered to the tapir were harvested from Guanacaste Pacific coast lowland deciduous forest, riparian evergreen forest within this deciduous forest, and secondary succession habitats within both forest types. Many species of foliage that I offered him were harvested within a few kilometers of the corral and therefore only a few minutes to an hour elapsed before they were offered to the tapir.

Newly cut foliage was brought in by armloads or carried stuffed into large plastic bags. Offerings were made shortly after dawn (6:00–8:30 a.m.) or in late-afternoon (4:00–6:00 p.m.), depending on when the foliage was collected. Other foliage was collected at Santa Rosa National Park, a 2 hour drive to the north of the corral. These plants were collected between midnight and 5 a.m., stuffed into plastic bags, and offered to the tapir in the morning feeding. Fruits were collected at various

times and places, but were always fresh and intact when offered. The mature leaves in all foliage were 2–3 (June–July feedings) or 7–8 (December feedings) months old. As there was no hint that foliage of these different ages was treated differently (Tables 1–3), I have pooled the results in any discussion of foliage preferences.

Except for *Ochroma pyramidale* leaves, all foliage was collected during the rainy season within easy arm's reach of the ground and therefore within the normal foraging zone of an adult tapir. Except where otherwise noted, the foliage from woody species is from the crowns of adults, whether they be shrubs or trees. Foliage from young sucker shoots, saplings, and seedlings were generally not offered. The vegetation types from which I chose the plants to offer are still occupied by tapirs in Santa Rosa National Park. All foliage offered from native plants was from species that are, or would have been recently, available to foraging tapirs. The 381 species of native foliage offered to the tapir represent approximately 40 percent of the species of dicotyledonous plants known for the lowlands of Guanacaste Province, Costa Rica (Janzen and Liesner 1980). They were chosen because of their availability and my certainty of identification in the vegetative stage. The determination of the plants may be used with 100 percent confidence. Data from plants of questionable identity have been deleted. All plant names used here follow Janzen and Liesner 1980 but since the species are well konwn, they do not differ for the most part from those used in other taxonomic treatments of Costa Rican plants.

All data in this paper are based on series of offerings that took place in the tapir's morning or afternoon regular meal. If food scraps remained in the corral from the previous meal, these were removed before foliage was offered. Offerings were made by hand with the observer standing outside of the corral at the same place each time. The tapir was always an eager and attentive participant and did not require baiting to the feeding site with preferred foods. He would remain at the site sniffing or tasting offerings through as many as 20 consecutive rejected species of foliage. When the tapir walked away and remained away for more than a few minutes, that meal's offerings were terminated. An offering consisted of a single leafy branchlet containing 2–10 mature leaves and an intact shoot tip (often with a terminal new leaf). One leafy branchlet was held out to the tapir. In the offerings reported in Tables 1–3, in at least 99 percent of the trials, the response was either eager consumption of the foliage, or its rejection. Rejection was usually by sniffing and turning the head, but sometimes he chewed very briefly on the foliage and then spit it out. The same species of foliage was never offered consecutively, and was never offered more than five times during a meal. If the foliage was consumed, I permitted the animal to eat only 2–4 leaves before forcibly pulling the branchlet out of its mouth. Between 25 and 65 species of foliage were offered during a meal. This number was determined by availability of fresh foliage.

Sequential choice tests in a meal were terminated when all rejected plants collected had been offered at least twice and all accepted plants collected had been offered (and therefore consumed) at least twice.

A known accepted plant was then offered continuously until satiation with that species occurred (Table 4). This was then repeated for a second species of acceptable foliage, and sometimes a third. After this, the tapir was still always eager to eat species of acceptable foliage novel to that meal, but offerings were terminated. A variety of other patterns of offerings were tried in other meals, but the animal died before they could be extensively replicated. The results from these experiments are mentioned where useful.

Results

This tapir was willing to eagerly eat at least 111 species of native foliage and numerous species of fruits (Tables 2 and 4). However, at least 210 species of native foliage were invariably rejected (Table 1) and 60 species were treated ambiguously (Table 3). Despite the small number of offerings of each species of foliage, several patterns emerge.

Sets of closely realted species sometimes contained both strongly rejected and strongly accepted species. *Tabebuia impetiginosa, T. rosea* and *T. ochracea* are common large trees in Guanacaste with superficially similar foliage (however, that of *T. ochracea* is somewhat more tomentose than that of the others). *T. impetiginosa* and *T. rosea* were readily eaten 45 different times (Table 2) while *T. ochracea* was rejected solely by odor on 25 different occasions (Table 1). On numerous occasions these acceptances and rejections occurred in consecutive offerings. *Helicteres baruensis* was accepted eagerly in 9 trials (Table 2) and 58 large mature leaves were eaten in one satiation feeding (Table 4). *Helicteres guazumaefolia* foliage was rejected in 13 offerings and never eaten (Table 1). If allospecific *Helicteres* leaves were offered in a mix, the tapir picked out the leaves of *H. baruensis.* Foliage of *Centrosema plumieri* and *C. sagittatum* were readily eaten (Table 2), and the latter in great quantity (Table 4). *Centrosema pubescens* was rejected 11 times and eaten once (Table 3). Foliage of *Crescentia cujete* was rejected by odor alone (Table 1) while that of *Crescentia alata* was readily eaten (Table 2). Foliage of *Rhynchosia calycosa* was spit out or never even picked up (Table 1), even when mixed with the highly edible foliage of *Rhynchosia minima* (Table 2). Foliage and stems of *Serjania atrolineata* were avidly eaten (Table 2) while those of *Serjania schiedeana* were rejected by odor (Table 1). *Byttneria catalpaefolia* foliage was eaten eagerly on 11 occasions (Table 2) while *Byttneria aculeata* foliage was rejected on 7 of 12 occasions and eaten only disinterestedly on 5 occasions (Table 3; and see discussion of spines below). *Calathea panamensis* foliage was readily eaten (Table 2) while *Calathea macrosepala* foliage was rejected 4 times (Table 1) even though these were alternated with offerings of *Calathea panamensis.* Three species of morning-glories (*Convolvulaceae*) were rejected by odor alone (*Ipomea carnea, I. fistulosa* and *Convolvus nodiflorus,* Table 1). However, foliage of 12 species was readily eaten (*Ipomea alba, I. hederifolia. I. meyeri, I. nil, I. trifida, I. umbracticola, Jacquemontia mexicana, J. pentantha, Euvolvulus tenuis, Operculina pteripes, Merremia aegyptica* and *M. umbellata*).

Among the Leguminosae, foliage acceptability was generally correlated with life form. Of the trees and shrubs, only *Pterocarpus rohrii* foliage was eaten readily. Absolute rejection occurred with 6 species of *Acacia, Acosmium panamensis, Albizzia adinocephala* and *A. guachepele, Andira inermis, Ateleia herbert-smithii,* 4 species of *Caesalpinia, Calliandra costaricensis* and *C. tapirorum,* 6 species of *Cassia, Dalbergia retusa, Delonix regia* (introduced), *Desmanthus virgatus, Diphya robinioides, Enterolobium cyclocarpum, Gliricidia sepium, Haematoxylon brasiletto, Hymenaea courbaril, Indigofera hirsuta, Inga vera, Leucaena glauca* (introduced), *Lonchocarpus minimiflorus* and *L. acuminatus, Lysiloma auritum* and *L. divaricata,* 6 species of *Mimosa, Myrospermum frutescens, Parkinsonia aculeata,* 4 species of *Pithecellobium, Platymiscium pleiostachyum, Prosopis juliflora, Schizolobium parahybum, Swartzia cubensis, Tamarindus indica* (introduced) (total 55 species). In addition nearly total rejection occurred with *Albizzia caribaea, Bauhinia ungulata, Lonchocarpus costaricensis* and *Machaerium biovulatum* (4 species). Large woody vines were not treated in the same manner. *Dioclea megacarpa* and *Machaerium kegelii* foliage was eaten readily. However, the foliage of *Acacia tenuifolia,* a large woody vine, was rejected (Table 1). Herbaceous legumes (vines and self-supporting) likewise produced quite unpredictable responses. Many were rejected outright: *Canavalia brasiliensis, Cassia stenocarpa, C. obtusifolia, C. leptocarpa,* 3 species of *Crotalaria,* 3 species of *Mimosa, Neptunia plena, Rhynchosia calycosa, Sesbania emerus,* and *Tephrosia multifolia* and *T. tenella* (15 species). A few were ambiguously treated (Table 3); *Dalea humilis, Mimosa pudica, M. polycarpa.* However, the number of offerings for the two species of *Mimosa* is so low that little importance should be attached to this acceptability ranking. Many herbaceous legumes were eaten freely (Table 2): *Aeschynemone americana, A. scabra, Calopogonium mucunoides, Centrosema plumieri, C. sagittatum, Cracca mollis,* 3 species of *Desmodium, Galactia striata, Mucuna pruriens, Pachyrhizus erosus, Phaseolus vulgaris* (introduced), *Rhynchosia minima* and *Vigna vexillata* (15 species).

A very larger number of species of foliage of large forest trees were rejected by the tapir. However, ecologists generally expect fast-growing second growth tree foliage to be edible to large herbivores. Foliage of the fast-growing trees *Luehea candida, L. speciosa, Guazuma ulmifolia, Cecropia peltata, Ochroma pyrimidale, Muntingia calabura, Spondias mombin, S. purpurea,* and *Bombacopsis quinatum* conformed to this expectation (Table 2). However, the foliage of *Trema micrantha, Acacia* spp., *Bursera simaruba, Carica papaya, Ceiba pentandra, Sterculia apetala, Bauhinia ungulata, Cordia* spp., *Cassia* spp. and other fast-growing species was highly unacceptable to the tapir (Table 1).

There are number of surprises contained in Table 2. Rubiaceae usually have foliage rich in alkaloids and are rejected by vertebrate herbivores, but the common evergreen shrub *Alibertia edulis* was avidly eaten (Tables 2, 4). Araceae provided a similar example. The leaves of the epiphyte *Monstera* cf. *adansonii* were eagerly eaten (Table 2) while the leaves of the epiphytic aroids *Philodendron hederaceum* and *P. scandens* both caused immediate regurgitation or vomiting when eaten for the first and only time (Table 1). *Colocasia esculenta* leaves (Araceae) were rejected by odor (Table 1).

Some very aromatic foliage was eaten. The foliage of the herb *Ruellia inundata* is extremely aromatic yet was eaten avidly and in bulk (Tables 2, 4). *Citrus paradisi, Piper marginatum* and *P. tuberculatum* likewise have very aromatic foliage yet were readily eaten in bulk (Tables 2, 4). Even some very tannin-rich foliage such as *Rhizophora mangle* was eaten avidly. *Brosimum alicastrum* foliage is very rich in latex, but its eager consumption by the tapir (Tables 2, 4) was expected since cattle and horses also eat this tree's foliage very readily.

There were some truly ambiguous responses by the tapir (Table 3). I suspect that most of these ambiguities could have been resolved had he not died. *Cochlospermum vitifolium* was one of the most perplexing. On one series of three days (December 1976) he rejected *C. vitifolium* each morning and ate it in each afternoon. All the foliage came from the same plant. Other ambiguously treated species (e.g., *Anacardium excelsum, Licania arboreum, Lantana camara, Spondias purpurea)* could be due to either plant traits or tapir idiosyncrasies. One source of ambiguity appeared to be a learning phenomenon. Those 9 species marked with an asterisk in Table 3 were eaten once or twice and then rejected many times after. The occassional rejections recorded in Table 2 were the 2nd or 3rd offering of a species readily eaten at other times and usually occurred toward the end of a meal.

There was no hint that ambiguity was generated by changes in the tapir's preferences during the period December 1976 to July 1978. The complex of *Piper* species and *Ficus* species never really gave consistent results and probably would have required many more trials to resolve. With these species, the tapir would often eat one sample avidly and then reject another conspecific sample a few minutes later, and then again accept this species later in the meal. Except for *Piper marginatum* and *P. tuberculatum,* no *Ficus* or *Piper* were consistently avidly eaten. The variation in response to the foliage of *Plumeria rubra* might have been a seasonal effect. He ate it 3 times in June, 1977 (Table 3) and in August (Table 5) but then firmly rejected the plant in December of 1976 and 1977 (Table 3).

Foliage of cultivated garden plants had quite different acceptability from that of wild relatives. The foliage of no species of wild Solanaceae was readily eaten (Tables 1 and 2) except for one apparent learning experience with wild *Capsicum frutescens* foliage (see below). However, foliage of the solanaceous plants tomato *(Lycopersicum esculentum),* and eggplant *(Solanum melongena),* was higly acceptable (Table 2). Foliage of domestic sweet pepper plants *(Capsicum annuum)* was rejected (Table 1). It is tempting to suggest that this was due to memory association with *Capsicum frutescens.* Three days before the first *C. annuum* trial (June 1977), I offered him a branch of *C. frutescens* (bird's-eye chili) with ripe fruit on it. He ate foliage and fruit and then violently spit them all out. From then on fruit-free foliage of *C. annuum* was rejected by odor (Table 3).

Foliage of 4 wild cucurbits *(Cayaponia racemosa, C. attenuata, Luffa cylindrica, Momordica charantia)* was rejected while the foliage of one was eaten *(Rytidostylis carthaginensis,* which has immature fruits and foliage that are highly edible to me).

However, the foliage of canteloupe *(Cucumis melo)* cucumber *(Cucumis sativus)* and squash *(Cucurbita pepo)* was readily eaten (Table 2). *Capsicum annuum, Raphanus sativus, Colocasia esculenta* and *Musa sapientum* were the only other herbaceous garden plants whose foliage was rejected. The first three have gustatorly-conspicuous strong secondary compounds. Banana leaf *(M. sapientum)* rejection was enigmatic. The foliage of carrots *(Dacus carota),* dill *(Anatheum graveolens),* beet and swiss chard *(Beta maritima),* lettuce *(Lactuca sativa),* bean *(Phaseolus vugaris),* anise *(Pimpinella anisum),* and rutabaga *(Brasica campestris*) was eaten eagerly.

If a species of foliage was eaten eagerly when offered as a single branch, it did not follow that this species would be eaten until the tapir's gut was "full" if offered in quantity. No species of foliage offered in bulk was eaten in a quantity that could represent more than a few percentage of the tapir's stomach capacity (Table 4). Furthermore, highly acceptable species of foliage were consumed in widely variable amounts before satiation occurred. In view of the high variation in this amount in favored foliage such as that of *Ochroma pyramidale, Guazuma ulmifolia,* and *Citrus paradisi,* it would be unwise to draw conclusions here about relative acceptability of the different species of foliage in Table 4. On the other hand, that the amounts of these three species required to satiate him were quite different suggests that satiation amounts would be characteristic of each species. These comments apply to ripe fruit consumption (Table 4) as well.

When a mix of 11-14 species of foliage was offered in a single pile, the tapir quickly picked out the same species of plants that he ate when offered one species at a time (Table 5). The choice appeared to be by odor. In no case were otherwise rejected species (Table 1) eaten when part of a mix. Several ambiguously-treated species *(Hibiscus tiliaceous, Plumeria rubra, Lantana camara)* were eaten when part of a mix and one species in Table 3 *(Licania arborea)* was rejected when included in a mix (Table 5). There was no indication that these responses were due to confusion among species of foliage as they were being picked out of the pile. The tapir often paused with his nose held above an acceptable species buried below unacceptable species, and then rooted directly through unacceptable foliage to grab and pull out the acceptable species.

One one occasion I made sandwiches of single *Ochroma pyramidale* (balsa) leaves (higly acceptable, Table 2) with fillers of *Ceiba pentandra, Trema micrantha, Tabebuia ochracea, Enterolobium cyclocarpum, Musa sapientum* or *Pithecellobium saman* leaves (all unacceptable species, Table 1). The filler was two leaf layers thick.

The entire sandwich was taken in, chewed briefly, and the filler spit out of the sides of the mouth with hardly a pause in chewing. This exercise was repeated 5 times with each of the 6 kinds of sandwiches, with the same result all 30 times. The tongue clearly played a major role in sorting the leaf parts. The *Ochroma* leaves were entirely consumed.

Unripe fruits were generally treated in the same manner as the foliage that bore them. The nearly full-sized but unripe fruits of *Centrosema saggitatum, Triumfetta lappula, Lantana camara, Rytidostylis carthaginensis, Dioscorea convolvulaceae, Desmodium barclayi, Merremia aegyptica, Operculina pteripes, Solanum melongena, Cracca mollis, Guazuma ulmifolia, Aphelandra deppeana, Ipomoea alba, Muntingia calabura, Malvaviscus arboreus,* and *Citrus paradisi* were readily eaten by the handful. Likewise, he rejected unripe fruits of *Cayaponia racemosa, Cassia emarginata, Pithecellobium saman, Cassia grandis, Canavalia brasiliensis, Enterolobium cyclocarpum, Hymenaea courbaril, Cissus sicyoides, Ardisia revoluta, Andira inermis, Prosopis julifora,* and *Caesalpinia coriaria.* There were a few surprises. The foliage of *Alibertia edulis* and *Pachyrhizus erosus* were eaten (Table 2) but the green fruits were spit out for the former and rejected by odor for the latter. *Combretum farinosum* foliage is rejected (Table 1) but the sprays of green fruit were eaten readily.

Ripe fleshy fruits were generally eaten, though in highly variable quantity. During one meal he would consume the contents of at best 2 broken *Crescentia alata* fruits (a range horse will eat 10-15 in a meal, unpublished). His interest in fruits of *Enterolobium cyclocarpum, Pithecellobium saman* and *Prosopis juliflora* waned after 2-10 in a meal. He ate about 1 liter of *Ficus ovalis* fruits (more than 1000) in one meal and about 200 cc of *Byrsonima crassifolia* fruits (150) in the following meal. Other fruit records are listed in Table 4. As mentioned above, he would not eat ripe hot peppers *(Capsicum annuum)* and after experiencing this fruit would not eat ripe sweet peppers *(Capsicum frutescens).*

Chomelia spinosa ripe fruits are eaten in quantity by many mammals in the tapir's habitat but were rejected by smell and even spit out if hidden in acceptable food. Mangos *(Mangifera indica),* grapefruit *(Citrus paradisi),* bananas *(Musa sapientum), Hymenaea courbaril,* and *Guazuma ulmifolia* fruits were the favorites among those tried, if I may judge by his eagerness to get at them. In the herbaceous species with inflorescenses and infrutescenses scattered among the foliage, these reproductive parts are eaten along with the foliage (e.g., *Aeshynemone scabra, Ayenia micrantha, Baltimora recta, Bidens riparia, Calopogonium mucunoides, Chamaesyce hirta, Dalechampia scandens, Desmodium* spp., *Gomphrena decumbens,* etc.).

Ripe fruit consumption is more complex than foliage consumption in that seeds are involved. Small-seeded fruits such as those of *Guazuma ulmifolia, Ficus ovalis, Caesalpinia coriaria, Prosopis juliflora, Byrsonima crassifolia, Crescentia alata* and *Pithecellobium saman* were chewed up and the hard seeds swallowed intact. The seeds' fates were unrecorded. Among these seed species, the one with the greatest volume was the 7 mm long flattened ovals of *P. saman. Enterolobium cyclocarpum* seeds are 10-15 mm long flattened hard ovals. About half of them were explicity spit or casually dropped out of the mouth as the fruit was being chewed. The remainder were swallowed intact, but most of the were digested (Janzen 1981a). While the hard seed coats of expectorated seeds were sometimes dented or nicked, the seeds of *E. cyclocarpum* were usually not broken or superficially damaged while the

fruits were being chewed up. *E. cyclocarpum* seeds lie loosely in single-seeded cavities in the dry fruit pulp and ths explains the ease with which the tapir separated them from the pulp. The even larger seeds of *Hymenea courbaril* are 15-20 mm diameter oblate flattened irregular hard spheres. The dry fruit pulp (aril) adheres very tightly to the seeds and the seeds must be chewed hard, and with rotation, to strip off the pulp. In the process, most *Hymenea* seed coats were heavily gouged and knicked, and nearly all seeds were spit out. Normally only the first 2-5 *Hymenaea* seeds of a meal were swallowed, followed by spitting out as many as 100. If the *Hymenaea* seed was first scraped clean of pulp and then the seed offered imbedded in banana pulp, the smooth large seeds were invariably and quickly spit out. The very large pits (flattened ovals up to 10 cm long) of mangos *(Mangifera indica)* were invariably spit out irrespective of the fruit type in which they were imbedded in or the hunger state of the tapir.

H. courbaril pulp was clearly a very preferred food. While a satiation level was recorded for *Hymenaea courbaril* fruits (Table 4) it was for fruits that I broke open. It is not known if a wild tapir will open *H. courbaril* fruits, though peccaries can do so and local cowboy lore maintains that tapirs do also open *H. courbaril* fruits. The captive tapir only mouthed the smooth hard large pods and then spit them out. However, it was never starving when offered the pods. The satiation levels recorded in Table 4 are for the meal as well as the offering of individual items because once the tapir stopped eating *H. courbaril* fruit, it was disinterested in any other kind of food. If a bag of opened *H. courbaril* fruit was in the vicinity during feeding trials, the trials had to be discarded owing to the tapir's distraction due to constant attempts to get at the *H. courbaril* pulp. The tapir would even eat *H. courbaril* pulp while sound asleep if the fruit was placed between its lips. Only bananas were reasonable competitiors with *H. courbaril* fruit pulp for his attention.

Ripe bananas were consumed in bulk if offered. As with *H. courbaril* pulp, once a large meal of bananas had been eaten, all other foods were rejected. Bananas were excellent media for construction of artificial fruits with variable numbers of seeds (e.g., for examining spitting of *Enterolobium cyclocarpum* seeds Janzen 1981b) and for getting the tapir to swallow artificial seeds (e.g., buttons Janzen 1981a). Howeever, green bananas were rejected and somewhat green (slightly astringent) bananas were eaten in lesser quantity than fully ripe ones. This was in strong contrast to Costa Rican range horses, which ate green bananas in quantity. A ripe banana would be eaten by the tapir after apparent station had been reached with all other preferred foods except *H. courbaril* fruit pulp. The tapir often went to sleep with a piece of banana still in its mouth at the end of a banana satiation trial.

Aside from seed spitting and digestive seed predation (Janzen 1981a, 1981b), the tapir displayed some other heterogeneities in feeding behavior. He salivated copiously when eating the ripe dry fruits of *Enterolobium cyclocarpum, Pithecellobium saman* and *Caesalpinia coriaria.* All three taste very astringent to me and ripe *C. coriaria* fruits were once a source of commercial tannin (Howes 1953). Presumably the muco-polysaccharides in the excess saliva occupy the active sites on the tannins

(digestion inhibitors) in these fruits and may therefore render them less dangerous to gut enzymes. As mentioned earlier, the tapir responded to chewing of wild bird's-eye chili fruits by vomiting and regurgitation, and by rubbing his mouth against a tree trunk. When the tapir's nose was poked with a sharp spine at the time it was eating an acceptable food plant, he immediately spit out the plant and would not even mouth it in later offerings. However, I didi this with the foliage of only two species of plants (cotton and unidentified malvaceous shrub that was eaten in bulk). Spines appeared to be responsible for his rejection of *Smilax* leaves (Table 1). Before the feeding trials were initiated, he ate *Smilax* leaves readily from my hand. The recorded feeding trials (Table 1) were with foliage containing sharp spines, and he rejected this foliage after gentle chewing. However, I suspect that it may not be an absolutely general response. The spiny plants in table 1 were rejected by odor and therefore his reaction to their spines or urticating hairs was not tested (e.g., *Cnidoscolus urens,* all *Acacia* species except *A. angustifolia, Solanum hirtum*).

Discussion

This herbivore did not respond to offered species of foliage in an indiscriminant manner, and thus is like other large browsing herbivores. As nutrient and defensive chemical traits of these species of plants are not yet described, I cannot begin to ask if there are traits that would allow good *a priori* guesses as to the acceptability of a species of foliage to a tapir before it is offered. However, a few generalizations are possible. If the foliage is from a legume tree, it is very likely to be rejected. If it is a garden plant it is very likely to be eaten. Taxonomic similarity to an eaten or rejected species will be a poor predictor of foliage acceptability, except for the legume-based statement above. Foliage with olfactorily or gustatorily strong traits (e.g., *Citrus paradisi, Ruellia inundata*) may be eaten while other equally conspicuous plants (e.g., *Capsicum frutescens*) will be rejected. Some very bland species will be rejected by odor (e.g., *Trema micrantha, Musa sapientum*). Spines seemed to be a generally good defense, but not enough species were tested to put great faith in this conclusion.

Tapirs are becoming common in Santa Rosa National Park. While no quantitative data are yet available on the amount of food present of the species eaten by this tapir, it is my subjective impression that in tapir-occupied habitats, most of the species in Table 2 are now scarce below the height above the ground (about 2 m) at which a tapir can forage. I would have to range over many kilometers of trail to find enough food daily to feed one adult tapir in those habitats of the park where tapirs are now abundant.

Terwilliger (1978) observed the foraging by bread-subsidized free-ranging Baird's tapirs on Barro Colorado Island. As the approach in that study was very different from mine, comparison is not generally possible but there are a few specific differences of interest. Terwilliger emphasizes that living *Cecropia* foliage was not eaten but dead (fallen) *Cecropia* leaves were readily eaten. This might be a simple effect

of inter-specific discrimination by the tapirs (*C. peltata* in Costa Rica, *C. exima* in the Canal Zone). However, it is also possible that the free-ranging Barro Colorado Island tapir's have had unpleasant experiences with the very agressive *Azteca* ants on the common *Cecropia* plants. In the habitat where the Costa Rican tapir once ranged free, *Cecropia* is rare and low foliage is usually on unoccupied seedlings and young saplings. The leaves that I offered were free of ants and very eagerly eaten. The Barro Colorado Island tapirs apparently were not bothered by the spines on leaves of *Bactris* palms and *Byttneria aculeata* whereas the Costa Rican tapir was. In fact, *B. aculeata* was one of the plants whose leaves he would eat but whose spines bothered him. Perhaps free-ranging tapirs cannot afford to be as finicky as can a corraled one. The rejection of tree legumes in general (Table 1) contrasts with Terwilliger's report that the leaves of *Inga pezizigera, I. quatternata, Ormosia isthmensis, Platymiscium polystachyum* and *Swartzia simplex* were eaten. However, the one legume tree whose foliage was eaten by the Costa Rican tapir, *Pterocarpus rohrii,* was also eaten by the Barro Colorado Island tapirs. As the animals that Terwilliger observed did not allow the listing of rejected species of foliage nor determination of how they chose a microhabitat in which to browse, no conclusion can be drawn about the selectivity of the Barro Colorado Island tapirs. However, it is clear that there are many species of plants in the forest whose foliage they will consume at least in small amounts.

A comparison of this Baird's tapir's food preferences with those recorded for the Malaysian tapir *(Tapirus indicus)* in the wild does not lead to surprises. Medway (1974) found that a tapir "browsed very selectively from the . . . vegetation" and "avoided apparently succulent plants including bananas (foliage) and gingers, althought these were abundant, in favour of the foliage of one bushy herb, one shrub and the saplings of five tree species". Williams and Petrides (1980) found tapirs in Taman Negara (National Park), West Malaysia, rainforest to eat the foliage of over 115 species of understory plants (70 genera, 40 plant families), and Euphorbiaceae and Rubiaceae comprised 42 percent of the species taken.

"Nevertheless, the animals were selective browsers, eating the young leaves and growing twigs of relatively few of the many available shrub and tree species . . . Although the family Dipterocarpaceae dominates the canopy [and its seedlings and saplings are the commonest plants in the understory] no dipterocarps were found among the understory plants browsed by tapirs" (Williams and Petrides 1980).

It has been argued that large herbivorous mammals should eat a diet that is highly mixed as one of the mechanisms for dealing with toxic compounds in plants (Freeland and Janzen 1974). Implicit in such a process is the behavior of not filling the stomach with an acceptable food type even when encountered in bulk. This behavior was conspicuous in the Costa Rican tapir's response to acceptable food items. While these food items were eaten in many different meals (Tables 2, 4, 5) they were never eaten in quantity that could possibly approximate the stomach capacity of the tapir, even if they were the first food items to be eaten in a meal (Table 4). Likewise implicit in this process is the behavior of sampling new things but then

quickly learning to reject them (as do wild guinea pigs, Jacobs and Labows 1979). At least 9 of the accumulated feeding records in Table 3 appear to represent such behavior. Furthermore, I suspect that most of the plants in Table 1, usually rejected by smell alone, were species of plants that he had learned to reject years ago while foraging freely in the forest. It is even likely that those occasions where a bit of tasting (chewing) was required for rejection served as memory prompters. It was conspicuous that once a plant had been rejected after a taste, it was rejected by odor alone on all subsequent trials, with these trials being as much as a year apart. Tapirs are caecal digestors (Janis 1976). Since there is therefore no large microbe-filled rumination chamber in which the food is processed before it hits the absorptive surfaces of the small intestine, tapirs should eat a smaller subset of the total plants in a species-rich tropical habitat than can a ruminant. In an on-going study I am finding that captive white-tail dear *(Odocoileus virginiamus)* eat a larger percentage of the species of plants listed in Tables 1-3 than did the tapir, but this is also true of captive collared peccaries *(Tayassu tajacu).*

The food of two other large herbivores has been studied in the vegetation type from which the plants for this study were chosen. Glander (1975) and Rockwood (1976) pooled their knowledge of the food of howler monkeys *(Alouatta palliata)* and leaf-cutter ants *(Atta colombica)* and found that they "prefer different plant species. Of seven rank correlations between monkey and ant preferences, three were negative, and the best possible correlation was 0.100, which was not significant" (Rockwood and Glander 1979). To compare my results with this study, I can use only their feeding records for leaves and will not discriminate between their records of young and middle-aged leaves because the foliage I offered usually had intact shoot tips with some young leaves, as well as middle-aged leaves further down the stem. Of the 19 species they listed whose leaves were a "primary" food source for howler monkeys, the tapir absolutely rejected the foliage of 10 of them, ambiguously treated 5, and readily ate only 4 *(Cecropia peltata, Muntingia calabura, Pterocarpus rohrii, Spondias mombin)*. Of the 24 species whose leaves were a primary food source for the leaf-cutter ants, 22 were offered to the tapir and 16 of these were absolutely rejected. Of the 6 remaining species, 3 were ambiguously treated by the tapir and only 3 eaten readily. Many of the species whose foliage was most eagerly sought by the tapir are conspicuously missing from both lists given by Rockwood and Glander (1979): e.g., *Guazuma ulmifolia, Luehea candida, L. speciosa, Alibertia edulis, Ochroma pyramidale, Malvaviscus arboreus, Tabebuia rosea, T. impetiginosa.* Likewise, conspicuously missing from the food of the howler monkey and the leaf-cutter ants are shrubs, herbaceous upright plants and vines. Some of these life forms may be generally missing from howler monkey diets because of physical inaccessibility, but this explanation certainly does not apply to diets of leaf-cutter ants. In short, the opportunity for day-to-day competition among foraging leaf cutters, howler monkeys and tapirs seems minimal in the deciduous forest from which the plants were drawn.

I have avoided applying the label "generalist" to the tapir in hopes of staying away from the muddle over how "generalists" (whatever they are) are supposed to feed

(e.g., Isley 1946, Blackith and Blackith 1966, Otte and Joern 1977, Otte 1975, Cates and Orians 1975, Rockwood and Glander 1979) and because that label is deceptive. The tapir I experimented with was in no sense an indiscriminate consumer. While he ate the foliage of many more species of plant than do most foliage-eating insects, for example, he appeared to have quite specific responses to each of those species. In a very real sense, an animal that selectively mixes his diet and monitors the amounts of each kind of food coming in is much more specialized than an animal that sits down on one relatively enormous food plant and gorges on the substrate. I feel that we are at that point in herbivore food studes where a detailed understanding of what the herbivore is doing is needed much more than a study of its "predicted" behavior.

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Table 1. Species of foliage absolutely rejected by a captive adult male Baird's tapir *(Tapirus bairdii)* by odor (usually) or brief taste (Finca La Pacífica, Cañas, Guanacaste Province, Costa Rica).

Plant	NUMBERS OF TRIALS				
	Dec '76	Jun '77	Dec '77	Jul '78	Σ
Acacia angustifolia	–	4	1	–	5
Acacia collinsii (with ants)	10	–	10	–	20
Acacia collinsii (without ants)	–	–	10	2	12
Acacia cornigera (without ants)	2	3	1	2	8
Acacia farnesiana	1	1	5	3	10
Acacia retusa	3	–	1	2	6
Acacia tenuifolia	2	–	1	5	8
Acacia new species	2	–	2	–	4
Acosmium panamense	1	2	–	3	6
Acrocomia vinifera (new leaf shoot)	2	–	2	–	4
Aegiphila martinicensis	2	–	4	1	7
Albizzia adinocephala	1	2	3	4	10
Albizzia guachepele	2	1	1	–	4
Allophylus occidentalis	7	1	5	5	18
Andira inermis	1	5	1	3	10

Annona holosericea	1	–	3	–	4
Annona purpurea	–	2	1	2	5
Annona reticulata	4	1	3	2	10
Aristolochia anguicida	–	3	1	–	4
Asclepias currasavica	4	2	2	3	11
Ateleia herbert-smithii	5	1	5	4	15
Banisteriopsis cornifolia	1	–	1	2	4
Banisteriopsis muricata	3	–	2	2	7
Bauhinia glabra	3	2	4	2	11
Bixa orellana	13	1	2	2	18
Boldoa purpurascens	–	–	1	–	–
Bougainvillea glabra (introduced)	1	1	3	–	5
Bromelia penguin	2	2	1	–	5
Bunchosia cornuta	–	1	1	–	2
Bursera tomentosa	2	1	5	2	10
Byrsonima crassifolia	6	1	1	2	10
Caesalpinia bonduc	7	1	–	4	12
Caesalpinia coriaria	2	–	1	3	6
Caesalpinia eriostachys	6	1	2	3	12
Caesalpinia exostemma	4	2	1	3	10
Calathea macrosepala	–	–	4	–	4
Calliandra costaricensis	3	–	1	2	6
Calliandra tapirorum	2	1	1	2	6
Canavalia brasiliensis	8	–	6	2	16
Capparis odoratissima	–	–	1	3	4
Capparis indica	2	–	–	2	4
Capsicum annuum (sweet fruit cultivar)	–	1	3	2	6
Carica papaya	4	1	2	3	10
Casearia corymbosa	4	–	2	–	6
Casearia sylvestris	–	–	–	2	2
Casearia arguta	1	1	2	4	8
Cassia alata (introduced)	3	–	2	2	7
Cassia biflora	3	3	4	2	12
Cassia emarginata	2	2	4	2	10
Cassia grandis	4	–	1	2	7
Cassia hayesiana	–	2	2	2	6
Cassia obtusifolia	2	1	2	–	5
Cassia skinneri	4	–	1	4	9
Cassia stenocarpa	2	1	2	–	5
Cassia leptocarpa	–	–	1	2	3
Cassia uniflora	–	–	1	1	2
Cayaponia attenuata	3	–	3	2	8
Cayaponia racemosa	5	–	1	1	7
Cedrela odorata	2	–	2	4	8
Ceiba aesculifolia	1	4	2	2	9

Ceiba pentandra	1	2	2	4	9
Celtis iguanaea	–	–	1	–	1
Cestrum nocturnum	1	3	2	–	6
Chamaesyce hyssopifolia	1	–	1	–	2
Chlorophora tinctoria (sapling only)	2	1	–	–	3
Chomelia spinosa	2	1	2	2	7
Cissus rhombifolia	5	2	2	4	13
Cissus sicyoides	6	1	1	–	8
Clematis dioica	–	1	1	4	6
Cleome spinosa	2	–	1	2	5
Cleome viscosa	1	–	1	–	2
Clidemia octona	–	–	1	1	2
Cnidoscolus urens	2	1	1	1	5
Coccoloba caracasana	1	3	1	2	7
Coccoloba venosa	2	–	1	–	3
Coffea arabica (introduced)	1	1	1	1	4
Colocasia esculenta (introduced)	2	1	–	–	3
Combretum farinosum	2	1	–	–	3
Combretum fruticosum	–	2	2	–	4
Conocarpus erecta	6	1	1	2	10
Convolvulus nodiflorus	–	–	4	–	4
Cordia alliodora	3	1	6	14	24
Cordia collococca	1	–	2	–	3
Cordia curassavica	–	1	2	2	5
Cordia dentata	4	1	1	–	6
Cordia gerascanthus	2	–	2	–	4
Cordia inermis	2	1	–	2	5
Cordia panamensis	1	–	3	4	8
Cordia pringlei	1	2	–	2	5
Crataeva tapia	5	–	1	2	8
Crescentia cujete	2	–	2	–	4
Critonia quadrangularis	–	–	2	–	2
Crotolaria maypurensis	3	1	1	2	7
Crotolaria pumila	1	3	1	2	7
Crotolaria retusa	–	–	4	–	4
Cyathula achyranthoides	–	–	1	–	1
Dalbergia retusa	8	3	1	2	14
Davilla kunthii	–	2	1	2	5
Delonix regia	3	1	4	2	10
Desmanthus virgatus	1	2	2	–	5
Diphysa robinioides	9	1	1	2	13
Dipterodendron costaricensis	1	3	1	2	7
Echites tuxtlensis	8	–	1	–	9
Eichornia crassipes	2	1	2	–	5
Enterolobium cyclocarpum	6	3	3	2	14
Erythroxylon havanense	–	2	–	4	6

Eugenia salamensis	5	–	2	2	9
Essenbeckia littoralis	–	2	1	2	5
Exostemma mexicana	1	2	–	2	5
Genipa americana	6	2	1	6	15
Gliricidia sepium	2	4	4	2	12
Godmania aesculifolia	6	2	1	2	11
Guaicum sanctum	3	2	1	–	6
Guarea luxii	1	2	1	–	4
Haematoxylon brasiletto	6	1	1	–	8
Hamelia patens	1	2	5	6	14
Heliconia latispatha	3	–	2	3	8
Heliconia osaensis	–	2	2	3	7
Helicteres guazumaefolia	3	4	4	2	13
Hirtella racemosa	–	2	–	2	4
Hymenaea courbaril	4	3	1	4	12
Hyptis suaveolens	4	1	4	–	9
Indigofera hirsuta	–	4	1	–	5
Inga vera	4	1	3	2	10
Ipomoea carnea	5	1	1	2	9
Ipomoea fistulosa	2	–	2	–	4
Jatropha curcas	1	3	2	2	8
Julocroton argenteus	2	–	3	2	7
Laguncularia racemosa	3	1	1	2	7
Leucaena glauca (introduced)	1	4	1	–	6
Lonchocarpus minimiflorus	9	3	2	–	14
Lonchocarpus acuminatus	4	–	2	2	8
Luffa cylindrica	5	2	2	–	9
Lycoseris latifolia	–	–	1	–	1
Lygodium venustum	4	1	4	10	19
Lysiloma auritum	3	1	1	–	5
Lysiloma divaricata	1	2	3	6	12
Malachra alceifolia	3	1	2	–	6
Malpighia glabra (introduced)	–	1	1	–	2
Manihot aesculifolia	2	–	1	4	7
Melothria trilobata	–	–	1	–	1
Miconia argentea	1	1	2	2	6
Mimosa albida	1	3	2	2	8
Mimosa aff. eurycarpa	5	–	4	2	11
Mimosa guanacastensis	1	3	1	2	7
Mimosa pigra	3	–	3	2	8
Mimosa pusilla	1	2	1	–	4
Momordica charantia (introduced)	1	–	3	1	5
Musa sapientum (introduced)	2	4	3	–	9
Myrospermum frutescens	1	2	1	2	6
Neptunia plena	3	–	2	–	5
Ocotea veraguensis	–	2	1	4	7

Pachyptera hymenaea	6	3	1	–	10
Parkinsonia aculeata	3	1	2	–	6
Passiflora platyloba	3	1	1	2	7
Paullinia cururu	3	1	1	2	7
Pavonia cancellata	1	1	3	–	5
Peperomia pseudo-dependens	–	–	1	–	1
Petiveria alliacea	1	–	2	–	3
Philodendron hederaceum	1	2	1	–	4
Philodendron scandens	1	3	3	–	7
Piper aduncum	–	–	1	–	1
Piper guanacaste	–	–	3	–	3
Piper jaquemontianum	–	–	1	–	1
Pithecellobium mangense	4	1	1	2	8
Pithecellobium oblongum	3	2	1	–	6
Pithecellobium saman	8	2	6	4	20
Pithecellobium platylobum	2	1	1	–	4
Pityrogramma calomelanos	1	2	1	–	4
Platymiscium pleiostachyum	1	1	2	–	4
Podopterus mexicanus	3	–	–	–	3
Porophyllum ruderale	–	–	4	–	4
Prosopis juliflora	3	2	1	2	8
Psychotria carthaginensis	1	–	1	–	2
Psychotria microdon	1	2	1	–	4
Randia echinocarpa	1	–	2	2	5
Rauvolfia ligustrina	3	1	2	2	8
Rhynchosia calycosa	1	–	5	–	6
Ricinus communis (introduced)	3	1	1	–	5
Rourea glabra	3	–	1	2	6
Sapindus saponaria	2	1	2	–	5
Sapranthus palanga	–	2	–	2	4
Schizolobium parahybum	3	–	1	–	4
Serjania schiedeana	1	–	2	6	9
Sesbania emerus	2	1	3	2	8
Simarouba glauca	7	2	–	2	11
Sloanea terniflora	2	2	1	–	5
Smilax DHJ 10732	1	2	1	–	4
Similax DHJ 10733	–	–	2	–	2
Solanum hirtum	1	–	1	–	2
Solanum americanum	3	1	1	–	5
Solanum ochraceo-ferrugineum	–	2	2	–	4
Solanum accrescens	2	–	1	–	3
Solanum hazenii	2	2	1	2	7
Solanum quitoensis (introduced)	–	–	–	2	2
Stegnosperma cubensis	2	1	1	–	4
Stemmadenia obovata	6	2	1	2	11
Sterculia apetala	7	1	1	2	11

Stigmaphyllon ellipticum	1	–	1	–	2
Swartzia cubensis	–	1	1	2	4
Swietenia macrophylla	2	2	1	–	5
Syngonium (juvenile)	–	1	1	–	2
Tabebuia ochracea	13	6	2	4	25
Tabernaemontana chrysocarpa	3	3	1	–	7
Tamarindus indica (introduced)	1	2	1	2	6
Tephrosia multifolia	3	1	1	–	5
Tephrosia tenella	–	2	1	–	3
Terminalia catappa	3	4	1	–	8
Terminalia chiriquensis	1	2	1	–	4
Thevetia ovata	2	1	4	–	6
Thevetia peruviana (introduced)	–	–	–	2	2
Thouinidium decandrum	10	3	1	10	24
Tillandsia brachycaulos	1	2	1	–	4
Tillandsia schiedeana	1	–	2	–	3
Trema micrantha	8	4	2	2	16
Trichilia trifolia	1	2	3	4	10
Trichilia cuneata	–	–	–	2	2
Trichilia hirta	–	–	1	–	1
Triplaris melaenodendron	2	4	2	–	8
Verbesina gigantea	2	–	4	–	6
Verbesina tonduzii	3	2	1	–	6
Vismia baccifera	1	3	1	2	7
Xanthoxylum setulosum	2	3	3	2	10
Xylophragma seemannianum	–	–	–	2	2

Table 2. Species of foliage readily eaten by an adult male Baird's tapir.

Plant	Dec. '76		Jun '77		Dec '77		Jul '78		Σ
	acc.	rej.	acc.	rej.	acc.	rej.	acc.	rej.	acc.
Acrocomia vinifera (mature leaflets)	2	–	4	–	2	–	–	–	8
Aeschynemone americana	4	–	6	–	6	–	2	–	18
Aeschynemone scabra	5	–	–	–	2	–	–	–	7
Alibertia edulis	8	–	1	–	4	–	2	–	15

Anatheum graveolens (introduced)	–	–	–	–	4	–	–	–	4
Apeiba tibourbou	1	–	2	–	–	–	4	–	7
Aphelandra deppeana	4	1	–	–	5	–	2	–	11
Artocarpus altilia (introduced)	2	–	1	–	2	–	–	–	5
Ayenia micrantha	3	–	1	–	5	–	2	–	11
Bactris major (mature leaflets)	2	–	1	–	1	–	–	–	4
Baltimora recta	4	–	3	–	6	–	1	–	15
Beta maritima (introduced)	2	–	2	–	2	–	–	–	6
Bidens riparia	5	–	1	–	4	2	–	–	10
Bombacopsis quinatum	5	–	4	–	1	–	4	1	14
Brasica campestris (introduced)	1	–	1	–	3	–	–	–	5
Brosimum alicastrum	14	1	1	–	10	–	2	–	27
Byttneria catalpaefolia	1	–	4	–	5	–	2	–	12
Calathea panamensis	–	–	–	–	4	–	–	–	4
Calopogonium mucunoides	5	–	4	–	3	5	–	–	12
Cardiospermum grandiflorum	2	–	–	–	2	–	–	–	4
Cecropia peltata	16	–	6	–	6	–	5	–	33
Centrosema plumieri	2	–	3	–	5	–	–	–	10
Centrosema sagittatum	4	–	1	–	6	–	1	1	12
Chamaesyce hirta	–	–	–	–	1	–	–	–	1
Chlorophora tinctoria *female* (adult)	11	–	1	–	4	1	2	–	19
male (adult)	–	–	2	–	–	–	–	–	2
Citrus limetta (introduced)	1	–	2	–	3	–	2	–	8
Citrus paradisi (introduced)	11	–	10	–	10	2	–	–	33
Costus spp.	4	–	2	–	4	–	–	–	10
Cracca mollis	–	–	1	–	2	–	–	–	3
Crescentia alata	2	1	2	–	5	–	–	–	9
Cucumis melo (introduced)	2	–	2	–	1	–	–	–	5
Cucumis sativus (introduced)	3	–	1	–	2	–	–	–	6
Cucurbita pepo (introduced)	1	–	1	–	2	–	–	–	4
Cydista diversifolia	10	–	–	–	2	–	2	–	14
Dacus carota (introduced)	2	–	1	–	1	–	–	–	4

Dalbergia glabra	6	–	1	–	1	–	2	–	10
Dalechampia scandens	2	–	1	–	1	–	–	2	4
Delilea biflora	–	–	2	–	4	–	–	–	6
Desmodium barclayi	2	–	1	–	2	–	2	–	7
Desmodium glabrum	2	–	–	–	4	–	–	–	6
Desmodium tortuosum	3	–	1	–	1	–	2	–	7
Dichorosandra hexandra	1	–	2	–	1	–	–	–	4
Dioclea megacarpa	2	–	3	–	1	–	2	–	8
Dioscorea convolvulacea	26	–	5	–	4	–	2	–	37
Euvolvulus tenuis	3	–	–	–	1	–	–	–	4
Ficus elastica (introduced)	2	–	–	–	–	–	–	–	2
Galactica striata	10	–	3	–	2	–	2	–	17
Gomphrena decumbens	–	–	–	–	1	–	–	–	1
Gouania polygama	–	–	2	1	2	–	4	–	8
Guazuma ulmifolia	39	6	4	–	6	–	2	–	51
Helicteres baruensis	2	–	3	–	2	–	2	–	9
Ipomoea alba	2	–	–	–	1	–	2	–	5
Ipomoea hederifolia	3	–	1	–	1	–	2	–	7
Ipomoea meyeri	7	–	2	–	1	–	–	–	10
Ipomoea nil	2	–	1	–	6	–	–	–	9
Ipomoea trifida	4	–	5	–	1	–	2	–	12
Ipomoea umbracticola	2	–	–	–	2	–	–	–	4
Isocarpha oppositifolia	–	–	–	–	1	–	–	–	1
Jacquemontia mexicana	1	–	–	–	2	–	2	–	5
Jacquemontia pentantha	3	–	2	–	1	–	–	–	6
Justicia carthaginensis	–	–	2	–	1	–	–	–	3
Lactuca sativa (introduced)	1	–	–	–	3	–	–	–	4
Laportea estuans	–	–	3	–	2	–	–	–	5
Loeselia aspera	1	–	–	–	–	–	–	–	1
Luehea candida	12	1	6	–	1	–	2	–	21
Luehea speciosa	8	–	2	–	6	–	2	–	18
Lycopersicum esculentum (introduced)	3	–	1	–	1	–	2	–	7
Macfadyena unguis-cati	4	–	4	–	1	–	–	–	9
Machaerium kegelii	2	–	3	–	2	–	–	–	7
Malvastrum americanum	5	1	1	–	3	–	1	–	10
Malvaviscus arboreus	11	1	4	–	8	1	6	–	29
Mangifera indica (introduced)	15	–	5	–	6	–	–	–	26

Maranta arundincea	1	–	–	–	3	–	4	–	8
Melampodium divaricatum	2	–	1	–	7	–	–	–	10
Melanthera aspera	6	–	5	–	6	2	–	–	20
Melochia nodiflora	8	–	4	–	7	1	–	–	19
Merremia aegyptica	4	–	1	–	4	–	2	–	11
Merrenia umbellata	4	–	4	–	1	–	2	–	11
Monstera cf. adansonii	4	–	1	–	2	–	2	–	9
Mucuna pruriens	15	–	1	–	2	–	2	–	20
Muntingia calabura	19	–	5	–	1	–	4	–	29
Nymphaea blanda	3	1	–	–	4	–	–	–	7
Ochroma pyramidale	13	–	4	–	3	–	4	–	24
Operculina pteripes	2	–	2	–	2	–	2	–	8
Oxalis frutescens	3	–	1	–	1	–	2	–	7
Pachyrhizus erosus	6	–	2	–	3	1	–	–	12
Panicum maximum	9	–	4	–	7	–	2	–	22
Petiveria alliacea	–	–	2	–	–	–	5	1	7
Pharus sp.	3	–	–	–	1	–	–	–	4
Phaseolus vulgaris (introduced)	2	–	2	–	1	–	2	–	7
Phorandendron quadrangulare	1	–	2	–	2	–	–	–	3
Phoradendron robustissimum	5	–	1	–	1	–	–	–	7
Pimpinella anisum (introduced)	–	–	1	–	1	–	–	–	2
Piper marginatum	23	–	6	–	1	3	–	–	30
Piper pseudo-fuligineum	–	–	–	–	2	–	–	–	2
Piper tuberculatum	39	1	6	–	2	2	–	–	47
Pisonia macranthocarpa	2	–	–	–	2	–	1	1	5
Pistia stratiodes	1	–	2	–	1	–	–	–	4
Pothomorphe peltata	2	–	2	–	1	–	–	–	5
Prestonia acutifolia	4	–	–	–	1	–	–	–	5
Previa lappulacea	2	–	1	–	4	–	–	–	7
Pseudabutilon spicatum	4	–	–	–	6	–	–	–	10
Psidium guineense	2	–	1	–	2	–	–	–	5
Psittacanthus calycalatus	4	–	1	–	2	–	–	–	8
Pterocarpus rohrii	12	–	1	–	4	–	2	–	19
Rhizophora mangle	4	–	3	–	1	1	2	–	10
Rhynchosia minima	4	1	3	–	3	1	–	–	10
Ruellia inundata	8	–	3	–	3	–	–	–	14
Rytidostylis carthaginensis	–	–	–	–	2	–	–	–	2

Scheelea rostrata (mature leaflets)	2	–	1	–	1	–	–	–	4
Serjania atrolineata	7	–	4	–	3	–	2	–	16
Sida acuta	5	–	2	–	5	–	3	–	15
Sida rhombifolia	3	–	6	–	1	–	1	–	11
Sida linifolia	2	–	–	–	2	–	2	–	6
Solanum melongena (introduced)	2	–	2	–	1	1	–	–	5
Spondias mombin	2	–	4	–	3	–	1	1	10
Stachytarpheta jamaicensis	6	–	2	–	5	–	6	–	19
Tabebuia impetiginosa	8	–	2	–	2	–	–	–	12
Tabebuia rosea	25	–	5	–	1	–	2	–	33
Tecoma stans (introduced)	2	–	–	–	1	–	–	–	3
Tectona grandis (introduced)	2	–	1	–	2	–	–	–	5
Thalia geniculata	4	–	–	–	2	–	–	–	6
Triunfetta lappula	11	1	6	–	2	–	4	–	23
Turnera ulmifolia	7	–	2	–	1	–	2	–	12
Typha sp.	5	–	2	–	3	–	–	–	10
Vigna vexillata	2	–	1	–	3	–	–	–	6
Waltheria indica	8	1	2	–	2	–	2	–	14
Wedelia acapulcensis	9	–	3	–	6	–	–	–	18
Wissadula excelsior	4	–	4	–	5	–	–	–	13
Wissadula hirsuta	3	–	6	–	8	–	–	–	17
Zizyphus guatemalensis	2	–	2	–	4	–	2	–	10

Table 3. Species of foliage ambiguously treated by an adult male Baird's tapir.

Plant	Dec. '76		June '77		Dec. '77		Jul. '78	
	acc.	rej.	acc.	rej.	acc.	rej.	acc.	rej.
Acalypha garnieri	–	–	–	–	2	2	2	–
**Albizzia caribaea*	2	3	–	2	–	2	–	–
Amphilophium paniculatum	7	6	2	–	3	–	2	–
Anacardium excelsum (saplings)	4	3	1	–	–	2	–	–
Anacardium occidentale (introduced)	–	–	–	–	2	1	–	–

Ardisia revoluta	8	5	–	–	–	2	–	–
Astronium graveolens	–	–	–	–	–	1	3	1
Avicennia germinans	3	2	1	–	–	–	–	–
Bactris guineensis (mature leaflets)	2	4	–	–	–	–	–	–
**Bauhinia ungulata*	1	6	–	1	–	1	–	2
Bernardia nicaraguensis	–	–	–	–	3	3	1	1
**Bursera simaruba*	–	7	–	–	1	8	–	4
Byttneria aculeata	1	3	–	–	4	2	–	2
**Calycophyllum candissimum*	–	8	1	3	–	4	–	4
Capparis frondosa	1	3	–	–	–	–	–	–
Capsicum frutescens	1	–	1	2	–	1	–	2
**Casearia corymbosa*	2	9	–	1	–	3	–	2
Castillia elastica	–	–	–	–	–	1	2	–
**Centrosema pubescens*	–	4	–	2	1	3	–	2
Chromolaena oerstediana	–	–	–	–	1	2	–	–
Cochlospermum vitifolium	11	4	1	–	–	2	4	2
Cocoloba padiformis	2	5	–	–	–	–	–	–
Cupania guatemalensis	–	–	–	–	–	–	1	1
Curatella americana	–	–	–	–	–	–	1	1
Dalea humilis	6	7	–	–	–	2	–	–
Eleocharis elegans	1	2	–	–	–	–	–	–
Ficus goldmanii	1	6	–	–	2	3	–	–
Ficus hondurensis	–	–	–	–	1	2	–	–
Ficus insipida	–	–	–	–	1	4	–	–
Ficus obtusifolia	4	2	–	–	–	–	–	–
Ficus ovalis	3	4	–	–	1	6	–	–
Ficus cotinifolia	–	–	–	–	4	1	–	–
Ficus morazaniana	–	–	–	–	3	–	–	–
Guettarda macrospermum	–	–	–	–	3	4	–	4
**Hemiangum excelsum*	–	2	1	2	–	2	–	4
Hibiscus tiliaceus	5	2	2	–	2	–	–	–
Hura crepitans	2	3	–	–	–	–	1	1
Hyptis capitata	–	2	–	–	1	–	–	–
**Jacquinia pungens*	2	3	–	1	–	2	–	–
Lantana camara	8	4	3	–	2	5	5	1
Licania arborea	5	2	–	3	1	–	2	–
**Lonchocarpus costaricensis*	1	4	–	2	–	1	–	4
Ludwigia octovalvis	–	–	1	1	–	–	–	–
Machaerium biovulatum	–	–	–	–	–	1	2	4
Manihot esculenta (introduced)	7	–	–	1	–	1	–	2
Manilkara zapota	–	1	–	1	–	2	2	–
Mastichodendron capriri	2	1	–	–	–	–	–	–
Mimosa pudica	1	2	–	–	–	–	–	–
Mimosa polycarpa	1	2	–	–	–	–	–	–
Oplismenus burmanii	1	3	–	–	–	–	–	–

Phoradendron venezuelense	3	2	–	–	–	–	–	–
Piper reticulatum	–	2	–	–	1	–	–	–
Psidium guajava (introduced)	1	–	1	–	2	3	–	–
Prockia crusis	–	–	–	–	–	–	1	1
Plumeria rubra	–	2	3	–	–	3	–	–
Quassia amara	10	6	–	–	–	1	–	–
Quercus oleoides	4	4	–	–	–	–	–	–
Randia karstenii	3	5	–	–	–	–	–	–
Raphanus sativus	1	–	1	–	–	1	–	–
Sebastiana confusa	–	–	–	–	–	–	1	3
Spondias purpurea	–	1	–	–	1	1	2	–
Thelypteris sp.	1	1	–	–	–	–	–	–
Tetracera volubilis	–	–	–	–	–	–	2	2

* The tapir may have learned to reject these species during the feeding trials.

Table 4. Amounts eaten to satiation of highly acceptable foliage and fruits by an adult male Baird's tapir (*first items in a meal).

Foliage Plant Species	Fresh wt. (g)	Dry wt. (g)	Part	Quantity (date)
Spondias mombin	325	140	mature large leaves	26* (Dec. 1977)
Spondias purpurea	114	53	mature large leaves	88 (Dec. 1977)
Helicteres baruensis	145	52	mature large leaves	58 (Dec. 1977)
	133	48	mature large leaves	53* (Dec. 1977)
Triumfetta lappula	260	55	mature large leaves	37 (Dec. 1977)
Malvaviscus arboreus	215	74	mature large leaves	94 (Dec. 1977)
	185	63	mature large leaves	81* (Aug. 1977)
Crescentia alata	65	34	mature large leaves	72 (Dec. 1977)
Monstera cf. andansonii	462	125	mature large leaves	25 (Dec. 1977)
Licania arborea	62	47	mature large leaves	31 (Dec. 1977)
Ayenia micrantha	90	30	15-20 cm long branchlets of mature leaves	15 (Dec. 1977)
Cecropia peltata	423	122	mature large leaves from 1-2 m tall saplings	43 (Dec. 1977)
	unavailable		mature large leaves from 15 m tall tree	6 (Aug. 1977)
	unavailable		mature large leaves from 15 m tall tree	4* (Aug. 1977)
Luehea candida	120	52	mature large leaves	40 (Dec. 1977)
Ochroma pyramidale	257	93	mature medium to large leaves	31* (Dec. 1977)
	83	30	mature medium to large leaves	10 (Dec. 1977)
	465	167	mature medium to large leaves	56 (Dec. 1976)
	714	257	mature medium to large leaves	86* (Jul. 1976)
	805	290	mature medium to large leaves	97 (Aug. 1977)

Quercus oleoides	31	26	5-10 cm long branchlets of mature leaves	11	(Dec. 1977)
Apeiba tibourbou	202	65	mature large leaves	31	(Dec. 1977)
	72	23	mature large leaves	11	(Jul. 1978)
Brosimum alicastrum	unavailable		10-15 cm branch ends with 4-6 leaves	26*	(Jul. 1977)
	unavailable		10-15 cm branch ends with 4-6 leaves	31	(Dec. 1977)
Muntingia calabura	60	22	terminal 15 cm of leafy branches	20	(Dec. 1977)
	48	18	terminal 15 cm of leafy branches	16	(Dec. 1977)
	66	24	terminal 15 cm of leafy branches	22*	(Jul. 1978)
Guazuma ulmifolia	107	52	terminal 5-10 cm of leafy branches	26	(Dec. 1977)
	119	58	terminal 5-10 cm of leafy branches	29*	(Dec. 1977)
	115	56	terminal 5-10 cm of leafy branches	28	(Jul. 1978)
	484	237	terminal 5-10 cm of leafy branches	118*	(Jul. 1977)
	160	78	terminal 5-10 cm of leafy branches	39	(Nov. 1977)
	414	203	terminal 5-10 cm of leafy branches	101	(Aug. 1977)
	645	284	mature large leaves	258	(Dec. 1977)
Citrus paradisi	50	19	terminal 5-10 cm of leafy branches	10	(Dec. 1977)
	110	41	terminal 5-10 cm of leafy branches	22*	(Dec. 1976)
	100	38	terminal 5-10 cm of leafy branches	20	(Aug. 1977)
	165	63	terminal 5-10 cm of leafy branches	33*	(Aug. 1977)
	60	23	terminal 5-10 cm of leafy branches	12	(Jul. 1977)
	40	15	terminal 5-10 cm of leafy branches	8	(Nov. 1977)
Pterocarpus rohrii	24	9	mature large leaves	15	(Dec. 1977)
Alibertia edulis	37	15	mature large leaves	37	(Dec. 1977
	40	16	mature large leaves	41	(Dec. 1977)
Dioscorea convolvulacea	112	21	mature large leaves	107*	(Jul. 1977)
	139	27	mature large leaves	132	(Dec. 1977)
Centrosema sagittatum	125	14	mature large leaves	278	(Dec. 1977)
Mangifera indica	174	87	mature large leaves	58	(Dec. 1977)
Tabebuia rosea	316	160	2-5 cm branch ends with 4-6 mature leaves	20	(Aug. 1977)
Piper marginatum	101	57	5-10 cm branch ends with 2-3 mature leaves	22	(Aug. 1977)
Piper tuberculatum	105	14	10 cm branch ends with 4-8 mature leaves	35	(Dec. 1976)
	108	14	10 cm branch ends with 4-8 mature leaves	36	(Jul. 1977)
Cholorophora tinctoria	unavailable		10-15 cm branch ends with 5-8 mature leaves	9	(Jul. 1978)
Ruellia inundata	unavailable		20 cm tops of upright herbs	12	(Jul. 1977)
	unavailable		20 cm tops of upright herbs	9*	(Nov. 1977)
	unavailable		20 cm tops of upright herbs	14	(Jul. 1978)

Fruits Plant Species	Part	Quantity (date)
Guazuma ulmifolia	green full-sized fruits*	46 (Dec. 1977)
	green full-sized fruits	37 (Dec. 1977)
	green full-sized fruits	25 (Dec. 1977)
	mature full-sized fruits**	25 (Dec. 1977)
	mature full-sized fruits	122 (Jun. 1978)
	mature full-sized fruits	158 (Jul. 1978)
	mature full-sized fruits	150 (Jun. 1978)
	mature full-sized fruits	85 (Mar. 1978)
	mature full-sized fruits	88 (Dec. 1977)
	mature full-sized fruits	91 (Jun. 1978)
	mature full-sized fruits	89 (Dec. 1977)
	mature full-sized fruits	254 (Jun. 1978)
	mature full-sized fruits	25 (Dec. 1977)
	mature full-sized fruits	156 (Jun. 1978)
	mature full-sized fruits	63 (Aug. 1977)
	mature full-sized fruits	199 (May 1978)
	mature full-sized fruits	78 (Aug. 1977)
	mature full-sized fruits	56 (May 1978)
	mature full-sized fruits	91 (Jul. 1977)
	mature full-sized fruits	125 (May 1978)
Enterolobium cyclocarpum	mature full-sized fruits	6 (Jul. 1977)
	mature full-sized fruits	3 (Jul. 1977)
	mature full-sized fruits	4 (Mar. 1977)
	mature full-sized fruits	2 (Dec. 1977)
	mature full-sized fruits	3 (Dec. 1977)
	mature full-sized fruits	4 (Dec. 1977)
Caesalpinia coriaria	mature full-sized fruits	4 (Dec. 1977)
	mature full-sized fruits	4 (Aug. 1977)
Prosopis juliflora	mature full-sized fruits	3 (Aug. 1977)
	mature full-sized fruits	4 (Nov. 1977)
	mature full-sized fruits	2 (Aug. 1977)
	mature full-sized fruits	3 (Aug. 1977)
Crescentia alata	pulp from mature full-sized fruits	2 (Jul. 1978)
	pulp from mature full-sized fruits	2,5 (Jul. 1978)
	pulp from mature full-sized fruits	2 (Jul. 1978)
	pulp from mature full-sized fruits	2 (Jul. 1978)
	pulp from mature full-sized fruits	1 (Jul. 1978)
	pulp from mature full-sized fruits	2 (Jul. 1978)
	pulp from mature full-sized fruits	1 (Jul. 1978)
Pithecellobium saman	mature intact full-sized fruits	8 (Aug. 1976)
	mature intact full-sized fruits	2 (Aug. 1976)
	mature intact full-sized fruits	5 (Aug. 1976)
Mangifera indica	mature intact full-sized fruits (seeds spit out)	16 (June 1978)
	mature intact full-sized fruits (seeds spit out)	9 (Aug. 1978)
	mature intact full-sized fruits (seeds spit out)	11 (Jul. 1978)

Byrsonima crassifolia	mature full-sized fruits	31 (Jun. 1978)
	mature full-sized fruits	43 (Jul. 1978)
Ficus ovalis	mature full-sized fruits	184 (Jun. 1977)
	mature full-sized fruits	286 (Jun. 1977)
Hymenaea courbaril	pulp with seeds from mature full-sized fruits (seeds spit out)	23 (Jun. 1977)
	pull with seeds from mature full-sized fruits (seeds spit out)	41 (Jul. 1978)
	pulp with seeds from mature full-sized fruits (seeds spit out)	19 (Dec. 1977)
	pulp with seeds from mature full-sized fruits (seeds spit out)	64 (Dec. 1977)
	pulp with seeds from mature full-sized fruits (seeds spit out)	48 (Dec. 1977)
	pulp with seeds from mature full-sized fruits (seeds spit out)	46 (Jul. 1977)
Musa sapientum	entire ripe full-sized fruits with peel	12 (June 1977)
	entire ripe full-sized fruits with peel	14 (June 1977)
	entire ripe full-sized fruits with peel	26 (June 1977)
	entire ripe full-sized fruits with peel	8 (June 1977)
	entire ripe full-sized fruits with peel	14 (Dec. 1977)
	entire ripe full-sized fruits with peel	18 (Dec. 1977)
	entire ripe full-sized fruits with peel	6 (Jul. 1977)
	entire ripe full-sized fruits with peel	10 (Jun. 1978)
	entire ripe full-sized fruits with peel	11 (Jun. 1978)
	entire ripe full-sized fruits with peel	12 (Aug. 1977)
	entire ripe full-sized fruits with peel	21 (Aug. 1977)

* One green fruit weighs 4.8 g fresh, 1.8 dry.
** One mature weighs 1.6 g fresh, 1.3 g dry.

Table 5. Mixes offered to Baird's tapir. All are reported in order of consumption (*rejected by being left behind).

11 August 1977, a.m.

Muntingia calabura
Guazuma ulmifolia
Hibiscus tiliaceus
Dioscorea convolvulacea
Panicum maximum
* *Lysiloma auritum*
* *Tabebuia ochracea*
* *Cordia alliodora*
* *Thouinidium decandrum*
* *Casearia corymbosa*
* *Stemmadenia obovata*
* *Solanum ochraceo-ferrugineum*

11 August 1977, a.m.

Piper tuberculatum
Amphilophium paniculatum
Citrus paradisi
* *Calycophyllum candissimum*
* *Carica papaya*
* *Thevetia ovata*
* *Coffea arabica*
* *Simarouba glauca*
* *Calycophyllum candissimum*
* *Bougainvillea glabra*
* *Lonchocarpus minimiflorus*

11 August 1977, a.m.

Panicum maximum
Dioscorea convolvulacea
Plumeria rubra
Panicum maximum
Plumeria rubra
Guazuma ulmifolia
Plumeria rubra
Dioscorea convolvulacea
Cydista diversifolia
Dioscorea convolvulacea
Panicum maximum
* *Lysiloma seemannii*
* *Myrospermum frutescens*
* *Hemiangium excelsum*

30 June 1977, p.m.

Baltimora recta
Melochia nodiflora
Tabebuia rosea
Costus sp.
Tabebuia rosea
Bombacopsis quinatum
Malvaviscus arboreus
Bombacopsis quinatum
* *Tabebuia ochracea*
* *Allophyllus occidentalis*
* *Cassia emarginata*
* *Andira inermis*
* *Cissus rhombifolia*
* *Ludwigia octovalvis*

* *Gliricidium sepium*
* *Godmania aesculifolia*

30 June 1977, p.m.

Lantana camara
Stachytarpheta jamaicensis
Muntingia calabura
Luehea candida
Gouania polygama
Stachytarpheta jamaicensis
Gouania polygama
Muntingia calabura
Waltheria americana
Tabebuia impetiginosa
* *Hymenaea courbaril*
* *Asclepias curassavica*
* *Dalbergia retusa*
* *Licania arborea*