

RAINY SEASONS AND CONSTELLATIONS:

THE DESÂNA ECONOMIC CALENDAR

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Brazil

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THE DESÂNA ECONOMIC CALENDAR

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## ABSTRACT

This chapter deals with a subject that has scarcely been touched on in Brazilian ethnological literature: an indigenous group's economic calendar. We discuss here the relationship between the subsistence activities of the Desãna Indians of the Tiquiẽ river, tributary of the Uaupẽs, the latter of the Rio Negro, Amazon, and the seasonal appearance of given constellations. Based on their empirical knowledge, the Desãna classify their region's climate into certain dry seasons, some quite short and others a little longer, interspersed with rainy seasons corresponding to the appearance of specific constellations in the sky. Both dry and rainy seasons are recorded here in the Desãna and Tukãno languages, according to indigenous taxonomical classification. Definite natural economic cycles correspond to these rainy seasons and constellations: the beginning, maximum ripening stage, and end of certain fruit harvests; spawning seasons and upstream migration of shoals of given fish species; and gathering of nutritionally important insects like leaf-cutter ants (*Atta* spp.), flying termites, and other edible invertebrates such as species of butterfly larva and grasshoppers. These atmospheric and celestial changes also coincide with the farming cycle. For example, the Desãna burn and clear forest land for the fields during the short dry seasons. Manioc tubers, their main source of carbohydrates, on the other hand, do not mature according to rainy seasons and constellations.

## ABSTRACT

O presente trabalho trata de um tema pouco veiculado na literatura etnológica brasileira: o calendário das atividades de subsistência de um grupo indígena, os Desâna do rio Tiquiê, tributário do Uaupês, por sua vez afluente do alto rio Negro, Amazonas, marcado pelo aparecimento de determinadas constelações. O conhecimento empírico dos Desâna classifica o clima de sua região em certo número de "verões", alguns muito curtos, outros um pouco mais prolongados, entremeados por chuvas, estas últimas anunciadas pelo aparecimento de constelações. Ambas são registradas aqui nas línguas Desâna e Tukãno, segundo a classificação taxonômica indígena. A estas chuvas e constelações estão associados ciclos econômicos naturais. Ou seja, o início, amadurecimento e término da safra de determinadas frutas; a ocorrência de piracemas e subidas de cardumes de certos peixes; safras de insetos como a maniuãra, a saúva, o "cupim alado", a "formiga da noite", de grande importância alimentar. E, ainda, de outros invertebrados comestíveis, tais como certas espécies de larvas de borboletas e gafanhotos. As referidas mudanças climáticas se vinculam também ao ciclo agrícola, uma vez que, nessas curtas estiagens se efetua a queima das roças. A maturação da mandioca, principal fonte de carboidratos, não é marcada pelas chuvas e constelações.

## Introduction

In 1978, the senior author studied the upper Rio Negro Indians' production tools in their indigenous economic context. During this first visit to the area, she had the opportunity to assist Tolamã Kenhíri and his father Umúsin Panlõn Kumu, in the editing of their book of myths, The World did not Exist Before. When she returned to the Rio Tiquié in 1985-1986 to complete her study, Tolamã Kenhíri (whose Christian name is Luís Gomes Lana) showed interest in publishing an article on the constellations that regulate the alternating rainy and dry seasons. The concatenation of these data resulted in this chapter.

In order to identify more readily the constellations, Ribeiro suggested that Kenhíri make drawings of them. The other illustrations that appear in this chapter are also his. Whenever possible, scientific names of flora, fauna and constellations are given.

## The stellar cycle

According to the Desãna, the constellations determine the alternation of rainy and dry seasons. Cutting, slashing and burning forest bush for fields, spawning seasons and upstream migration of fish, the ripening of certain fruits, and gathering seasons for edible invertebrates are all tied to these atmospheric/celestial changes.

The year begins in October. The constellation called "pit viper illumination" (aãã siñoliru /d/, aãã siñoka /t/ = pit viper, illumination) (1) (fig. 1) appears in the western sky.<sup>(1)</sup> The heavy rains that fall are known by the same name. The next constellations to appear are known as "pit viper head" (aãã dihpuro puiro /d/, aãã dēhpóá pueró /t/ = pit viper, flood) (fig. 2) and "pit viper body" (aãã dēhpē puiro /d/, aãã ēhpē pueró /t/ = pit viper, body, flood) (fig. 3). Next come a two-star

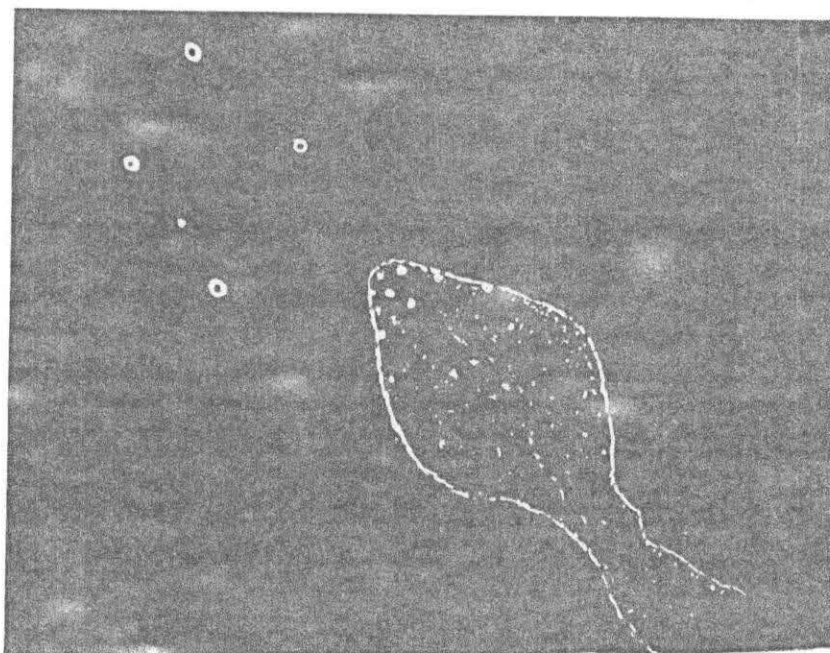


Fig. 1. Añã siñoliru (d), añã siñokã (t)  
(= pit viper, illumination).  
This constellation appears in October.

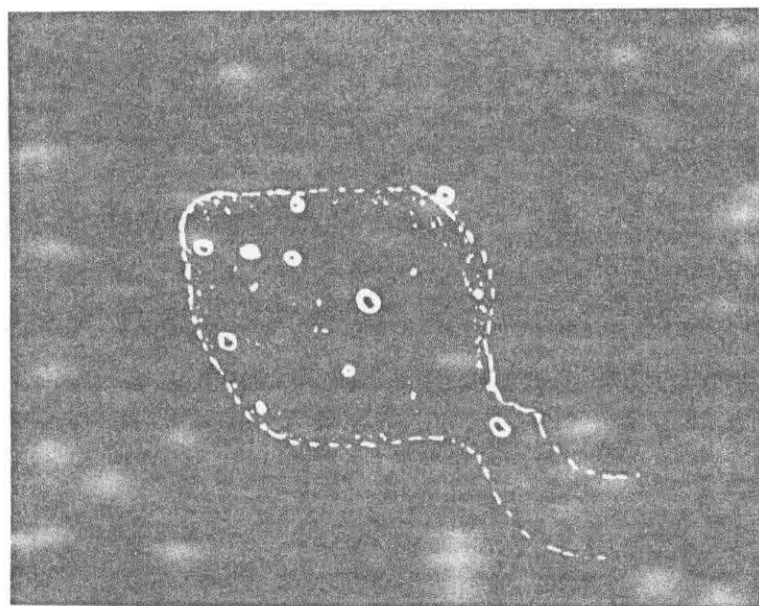


Fig. 2. Añã dipuro puiro (d), añã dēhpoã puerō (t).  
(= pit viper head, flood). October.

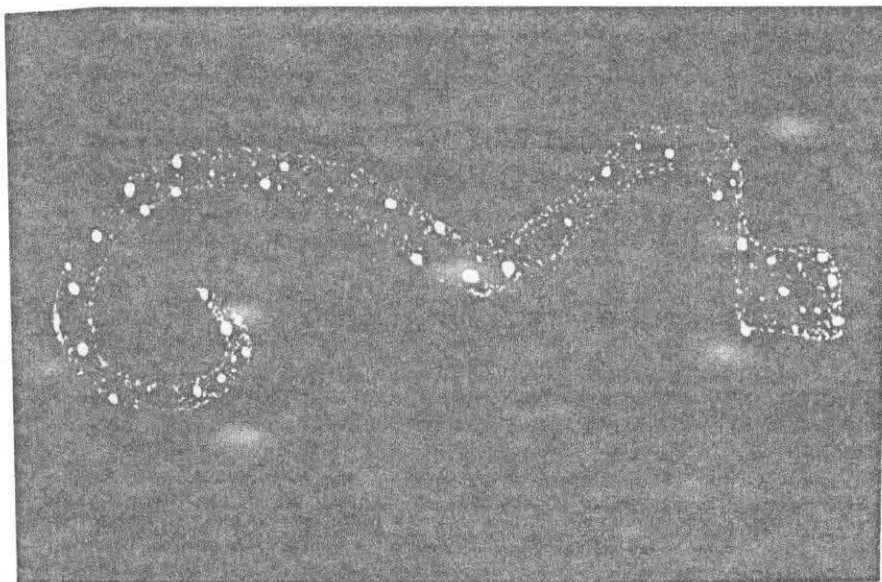


Fig. 3. Añã dēhpě puiṛō (d), añã ěhpě puerō (t)  
( = pit viper, body, flood). October.

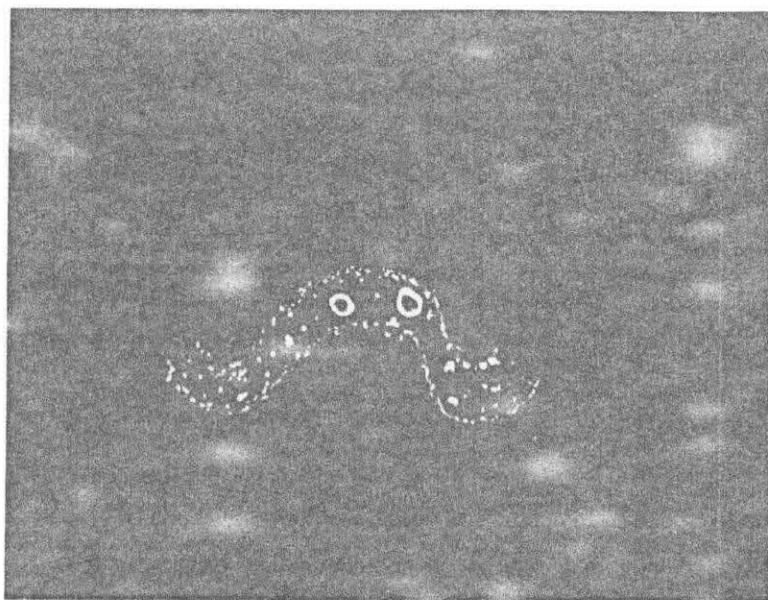


Fig. 4. Añã diubā puiṛō (d), añã diā'pā puerō (t)  
( = pit viper eggs, flood). October.

constellation and the corresponding rain, known as "pit viper eggs" (añã diubã puiro /d/, añã dia'pã puerõ /t/ = pit viper eggs, flood) (fig. 4).

In October, the Indians cut down trees and clear underbrush to plant their fields. Edible mushrooms grow on the fallen tree trunks in virgin forests. The three most important kinds are: ëiri (d), ëiesé (t), or "glue", a brown, spongy species (Auricularia delicata Fr.); a smaller brown one called tãka (d), ta'ká (t), and a third sponge-like white species called më dihti (d), me dihti (t), or "unari fruit, mushroom" (Polyporaceae). These mushrooms are gathered in October and November.

The abiu (star apple = Pouteria caimito) and ingã (Inga spp) fruits ripen in November. The peach palm (Bactris gasipaes) blossoms and begins bear fruit. The heavy rain, called "pit viper tail" (añã polerõ berõ /d/, añã pihkõlo betõ /t/ = pit viper, tail, round) (fig. 5) falls at this time also.

(2) During this rainy season, which lasts until December, the first spawning (tunini /d/, tunisé /t/) occurs. It is called "peach palm husk washing": ëni wahkini koerã (d), ëné wahkinsé koerã (t). The frogs also start croaking, which makes them easy to find, (2) and the maniuãra termites (Cornitermes sp.) start flying in limited numbers. —→ The "pit viper tail" flood starts to cover the igapõs (Amazonian flood lands). The Desãna set their matapis, a kind of fish trap called tëli (d), kasawë (t). Then the rains cease.

The abiu dry season (kané weré /d/, kané këná /t/ = star apple, summer), which lasts five days, occurs in January. The star apple then no longer bears fruit. It rains relatively little at this time, but there is no corresponding constellation to mark the period.

The ingã dry season (mené weré /d/, mené këná /t/) also corresponds to the end of this fruit's harvest. This dry season lasts eight to fifteen days. During this short interval, the Desãna burn the timber where they had cut down virgin forest three months earlier,



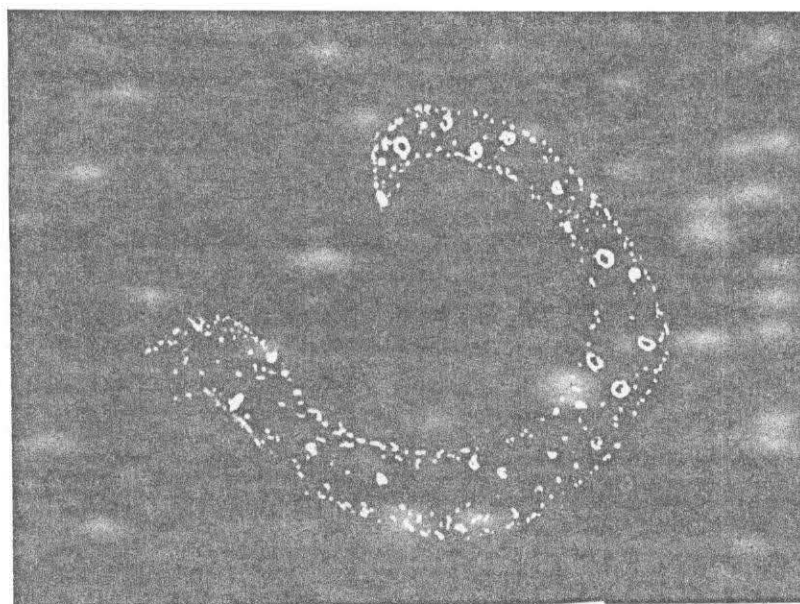


Fig. 5. Añã poléru beró (d), añã pihkōlo betó (t)  
(= pit viper, tail, round). November,  
December.

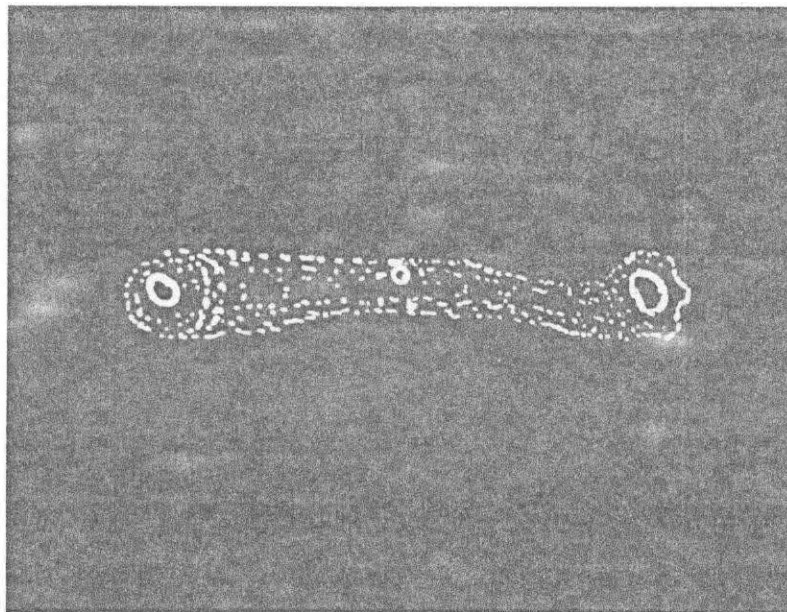


Fig. 6. Pamo ngoã dēhkā (d), pamo owā dēhkā (t)  
(= armadillo, bone, piece) constellation.  
January.

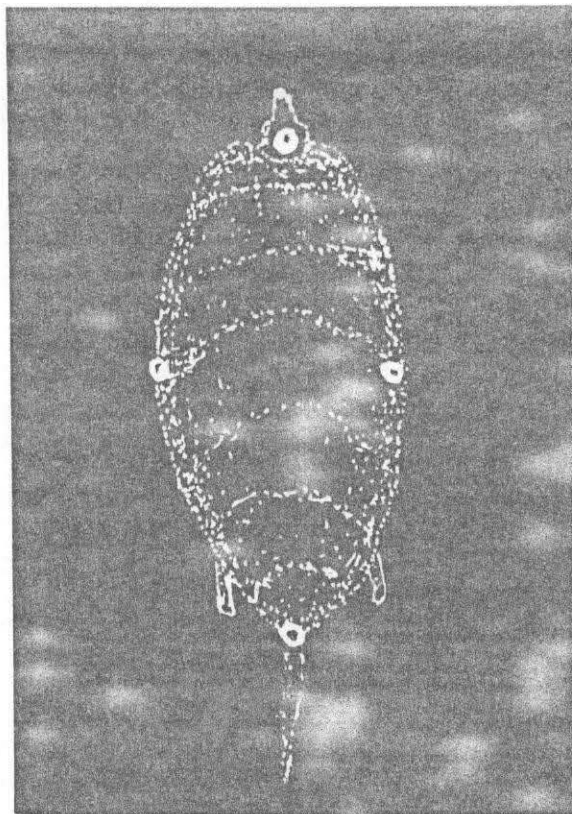


Fig. 7. "Armadillo" (pamo, d. and t.) constellation. February, March.

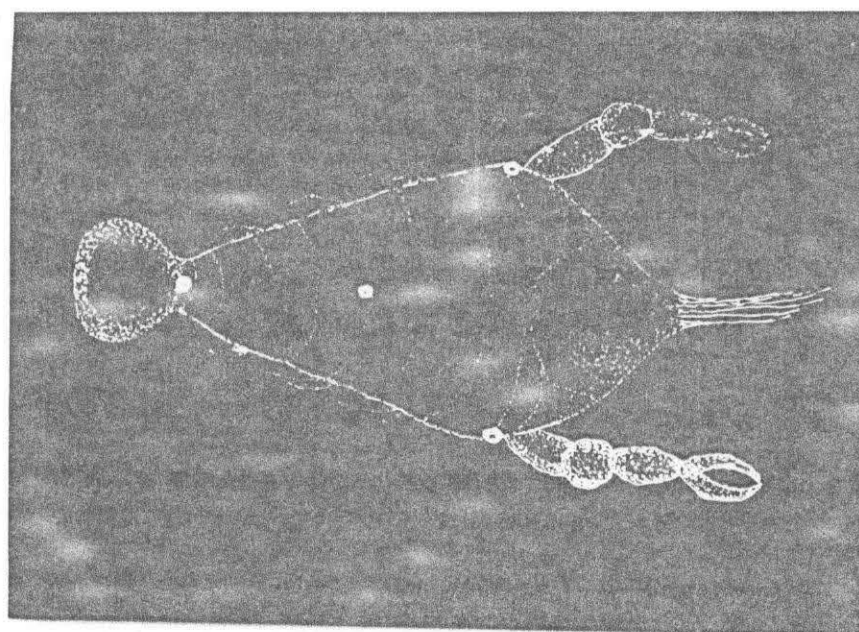


Fig. 8. "Shrimp" constellation: nahsin kamë, d.  
dahsiä wë, t. Appears on April.  
in

in October. They need at least seven days of hot sun to ensure a sufficient burning of the fallen trees. Then, they plant their crops.

The peach palm starts to ripen during the ingã dry season. When this dry season is over, around the end of January, the rainy season called "armadillo femur" (pamo ngôã dênkã /d/, pamo owê dênkã /t/ = armadillo, bone, piece) (fig. 6) begins. The corresponding constellation is accorded the same term. These rains are not heavy enough to flood the river margin lands (igapôs). Frogs croak, but there are no fish spawning, nor do the female leaf-cutter ants and other ants take flight.

Another rain, called "armadillo" (pamo /d/ and /t/) falls in February, when the armadillo constellation appears in the night sky (fig. 7). A second, larger spawning occurs during this rain, when the aracu (a characid) and other fish swim upstream.

After the armadillo rain there is a four-day period called iqui werê (d), isê kêmã (t) (iqui = cucura fruit; werê = summer). The cucura fruit (Pourouma cecropiifolia) starts to ripen slightly before the peach palm fruit. They bear fruit at the same time, although the cucura harvest ends before the peach palm. Like the star apple and ingã, the cucura and peach palm fruit ripen almost simultaneously, in early March. A light rain then falls, but the river does not rise much.

Another dry season occurs in mid-March. It is called ëni werê (d), ëné kêmã (t) (= peach palm, summer). Like the ingã dry season it lasts about two weeks. The forest cut down in November and December and the underbrush cleared in January are then burned.

The peach palm dry season ends as the shrimp constellation rain begins: nahsin kamê (d), dahsiã wê (t) (= shrimp, constellation) in April (fig. 8). Aracu's and other fish spawn for the third time.

Maniuára's and leaf-cutter ants fly again; the females are already laying eggs. Termites start taking flight during this rainy season; there are two species of the same size, both of which are edible.

While the shrimp constellation is visible, the nãmĩ mengã (d) nãmĩ mehkã (t) (= "nocturnal" ant), which is also edible, starts growing wings (3).

→ The shrimp constellation does not always indicate rain. If there is no rain, the entire economic cycle (the third spawning, the maniuára, leaf-cutter, termite and "nocturnal" ant's flight, and the frog's croaching) cease to exist. The Desãna say "The constellation was lost". When this happens, the peach palm dry season persists until April.

Another rain falls in the second half of April, when the constellation called yẽ disikã poalõ (d), yãĩ esõka poalõ (t) (= jaguar, chin, beard), also known as menã mên puiro (d), menon puerõ (t) (= maniuára flood) (fig. 9) appears in the sky. The spawning cycle ends this time.

The umari (Poraqueiba sericea) harvest, which begins when the fruit ripens in mid-March, also ends in mid-April. When the "jaguar beard" constellation rains stop, there are two or three sunny days interspersed with light rains.

→ Then comes a heavy, intermittent rainy season corresponding to the constellation called yẽ dẽhpã puiro (d), yãĩ ãhpã puerõ (t), or "jaguar, body, flood" (fig. 10). This constellation is visible for a long time, and frogs, which are edible, croak the whole time, so it is easier to catch them.

There is a four or five day dry spell after this heavy rain. It is called the umari fruit dry season: nã werõ (d), wamã kemã (t). Following these sunny days, the rains called yẽ polerõ berõ (d), yãĩ pihkõno betõ (t) (= jaguar, tail, round) arrive (fig. 11). Frogs stop

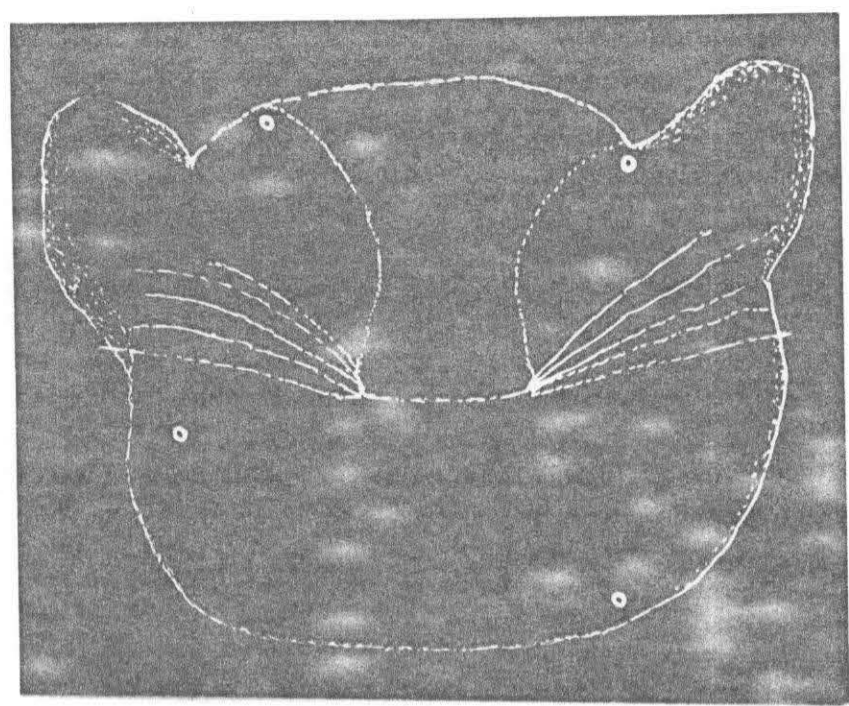


Fig. 9. Yē disikā poalō (d), yāi esēka poalō (t)  
(= jaguar, chin, beard) constellation.  
Appears on April.  
in

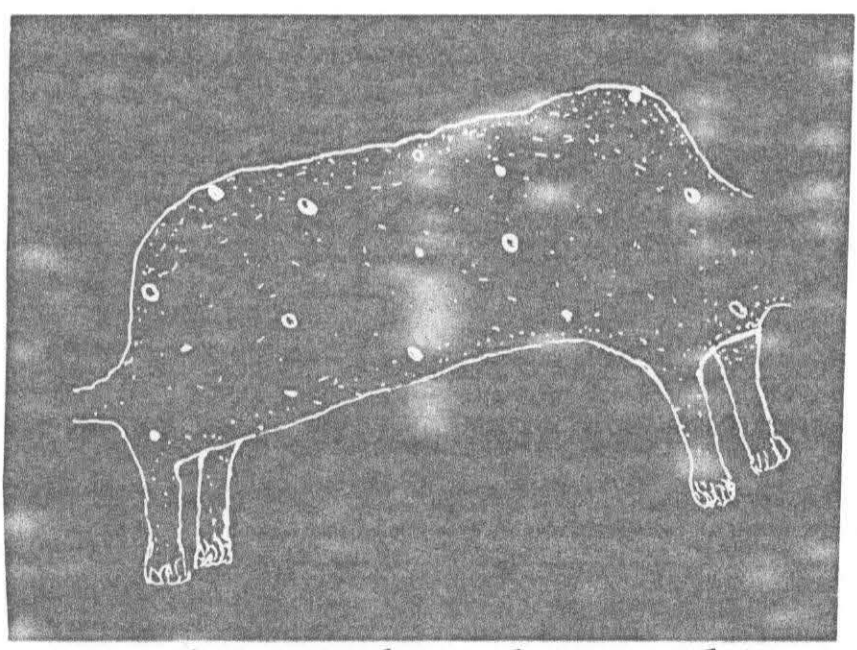


Fig. 10. Yē dēhpē puerō (d), yāi ēhpē puerō (t)  
(= jaguar, body, flood) constellation.  
Appears on April.  
in

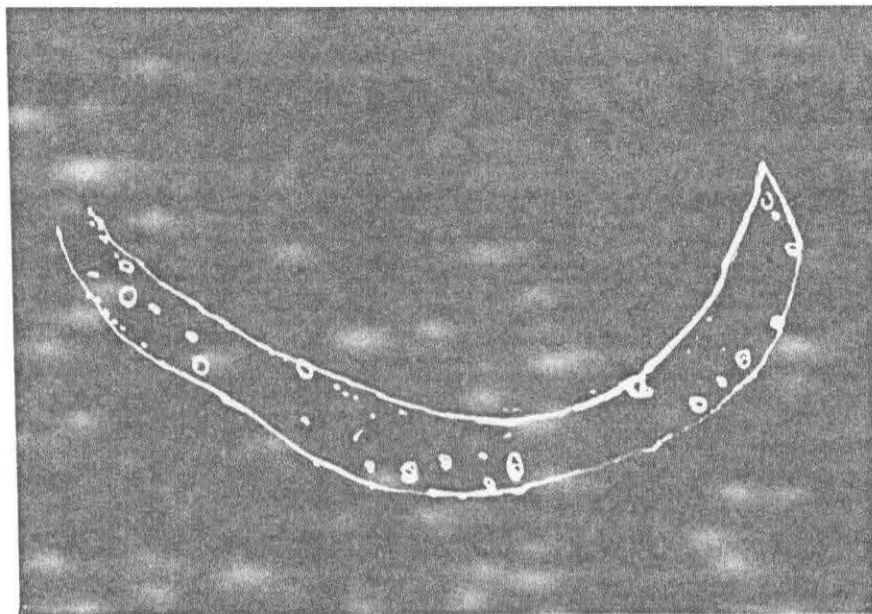
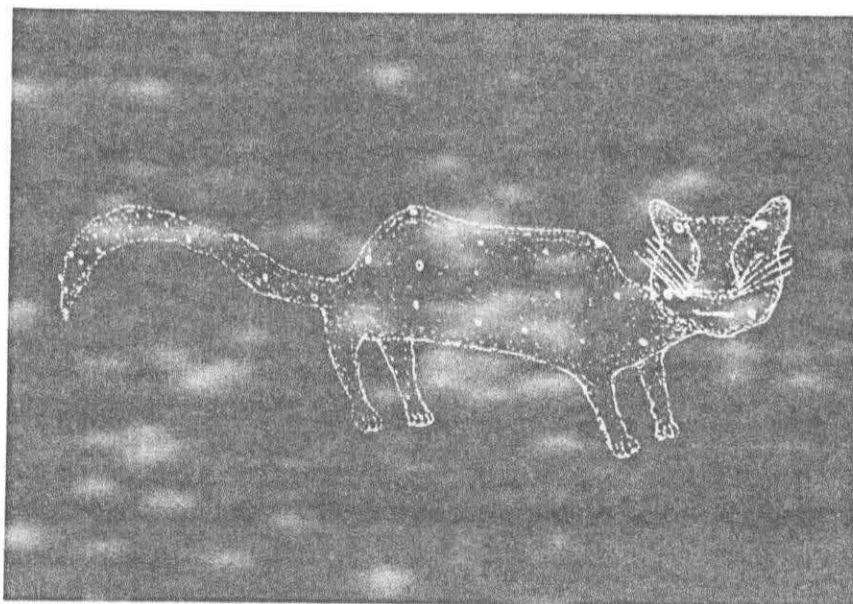


Fig. 11. Yē polerō belō (d), yāi pihkōno betō (t)  
( = jaguar, tail, round) constellation.  
Appears ~~no~~ April.  
in



The three "jaguar" constellations. (Compare figs. 8, 9, 10).

croaking and can no longer be found. The Indians stop gathering maniuāras and leaf-cutter ants. Only termites are still caught.

A rainy season called ñekān turu (d), ñehkon terō (t) (= star, piece) (fig. 12) occurs in May. The heaviest termite flights for both edible species occur at the same time, and then the edible insect cycle ceases. ----->

→ Another constellation known as wāi kaikā (d), wāi kasā (t) (= fish, smoked) (fig. 13) appears in May. Shortly thereafter another constellation called kāi saninō (d. and t.) or "gourd with umari pulp on a stand" (fig. 14) appears. Flocks of flycatchers migrate, coincidentally with the appearance of the three jaguar constellations, which perdure from late April to early May, and then disappear with the appearance of the kāi saninō constellation. No one knows the provenience of these birds.

(4) The intense, constant flood rains begin in May, and the great river rises. Both the permanent and temporary fish traps set during the ingā season, in late January, become submerged. The only fish that the Indians catch at this time are daguirus,<sup>(4)</sup> and then only at night with hook and line.

The rains that accompany these constellations last until mid-June. During the rainy spell in May (when the above-mentioned nekān turu /d/ constellation appears) the Indians remove the underbrush they will later burn in a three-day dry spell in June termed yhōka dēhpē bohotali (d), siōn iahpu kēmatasē (t), roughly translatabe as "adze feathered ornament, little summer" This underbrush is cleared mainly to plant corn, which is said to grow well when planted at this time. ----->

(5) → During this dry spell, the river level falls slightly but another rain called yhōka dēhpē puerō (d), siōn iahpu puerō (t), or "adze feathered ornament, flood" and respective constellation<sup>(5)</sup> (fig.15) soon comes.

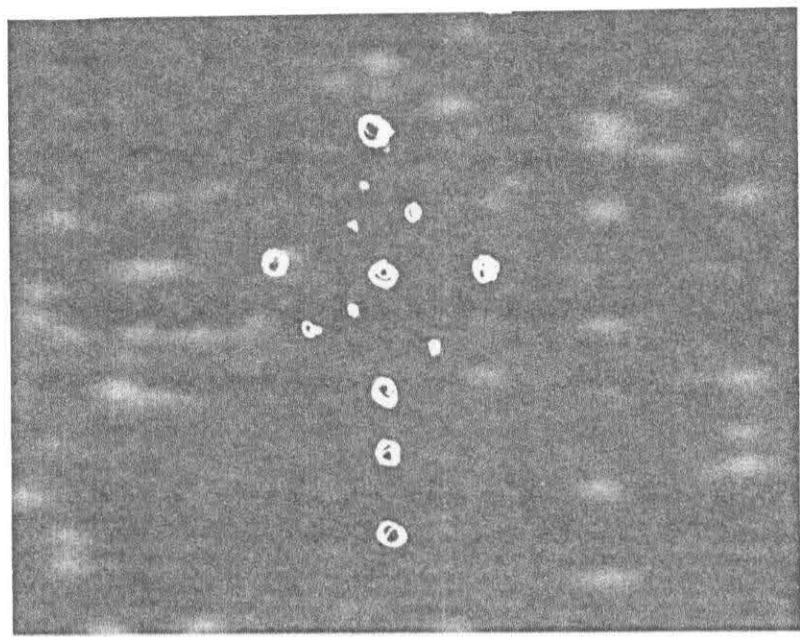


Fig. 12. Nēkan turu (d), ñehkon terō (t)  
in (= star piece) constellation.  
Appears on May.

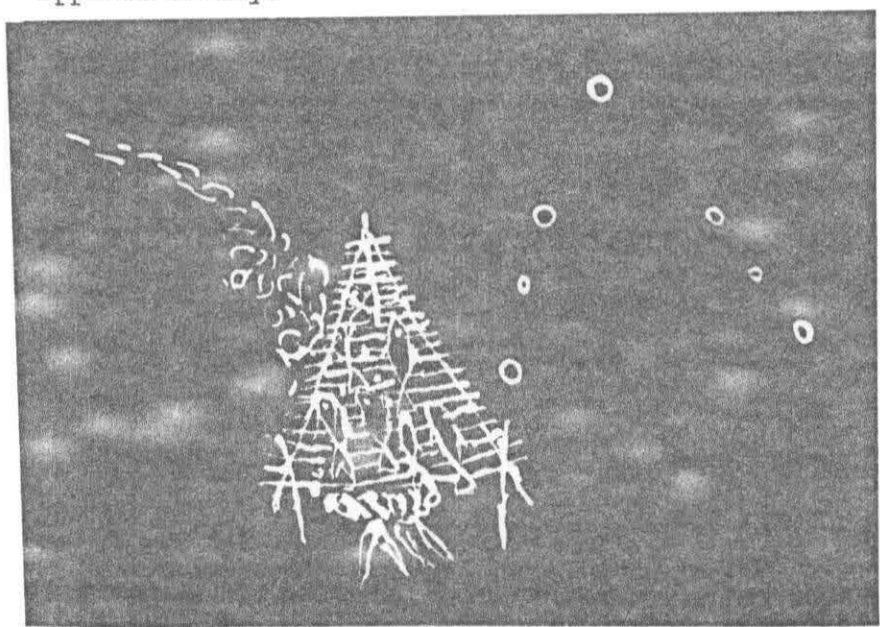


Fig. 13. Wāi kaiā (d), wāi kasā (t)  
(= fish smoked) constellation.  
Appears on May.  
in



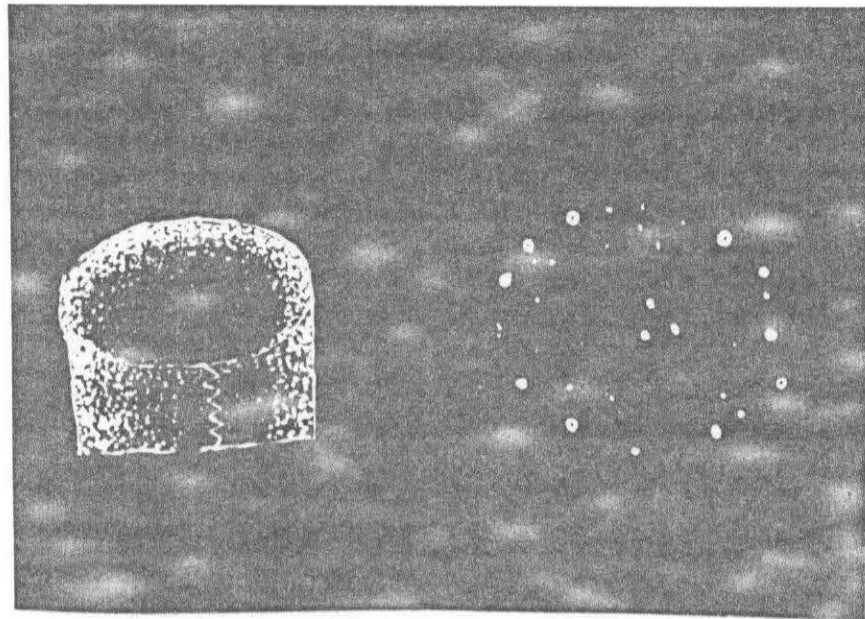


Fig. 14. Kái saninō (d. and t.) (= gourd with  
umari pulp on a stand) constellation.  
Appears ~~on~~ May.  
in

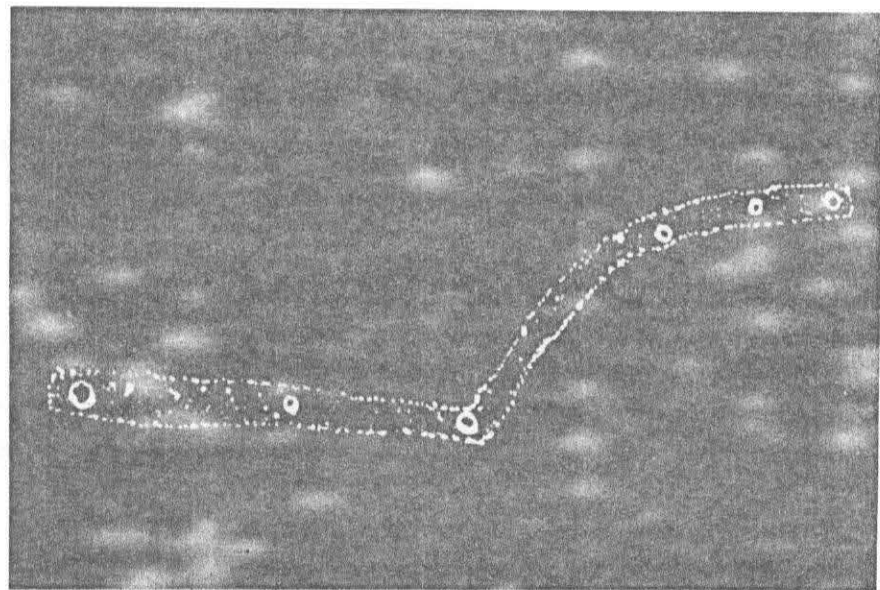


Fig. 15. Yohōka dēhpē puerō (d), si'ōn iahpu puerō (t)  
(= feather ornament, flood) constellation.  
Appears ~~on~~ June.  
in

By late June, the river again rises. It is possible to cross the Pari rapids by boat and go upstream to the Caruru rapids, which are not completely covered by the rising waters. Tiny fish (two to ten centimeters in length), called pirã-mirins, swim upstream and are caught in fine-mesh traps.

July is the time when grasshoppers take flight (manãni wĩra, d. and t.). They come in huge clouds that cover the village. The Indians catch them with their bare hands, using torches made of turĩ (Licania kunthiana), a volatile wood. They are sometimes used as bait for pacus (a characid), the only kind of fish that nibble on grasshoppers.

(6) Three constellations appear in July. The first one, with the concomitant rain, is called di'ã yowã (d. and t.) or the "otter constellation" <sup>(6)</sup> (fig. 16). Another constellation that sometimes shines rather dimly is called bihpiã dianã (d. and t.) which may be translated as "birds, very pretty" (fig. 17). Still another is nganiã dianã (d), ñaniã dianã (t), or "crab, very pretty" (fig. 18).

The intermittent rains that fall at the same time come with a cold front called kerã (d), wẽnẽ (t), or "sloth, cold front". The edible larva cycle begins then. These larva are quite tasty and go by the names of the trees, the leaves of which they eat.

Certain species of fish migrate up the Rio Tiquiẽ in shoals, but not to spawn. This phenomenon is called i'in wãĩ (d), i'ñã wãĩ (t), or "larva, fish", and begins in June. The first migration is called dëhkõ wehte'ngã (d), abkõ wahti'ñã (t), which means "rain, wahtin (a supernatural forest creature). The second wave occurs in July: pun wãĩ (d), puni wãĩ (t), or "leaf, fish". The third upstream migration comes in August, and is called yuhkẽ wãĩ (d. and t.), or "tree, fish".

The fish larva that mature enough to be edible are the nihtiã (d. and t.) which cling to cunuri trunks (Cunuria spruceana):

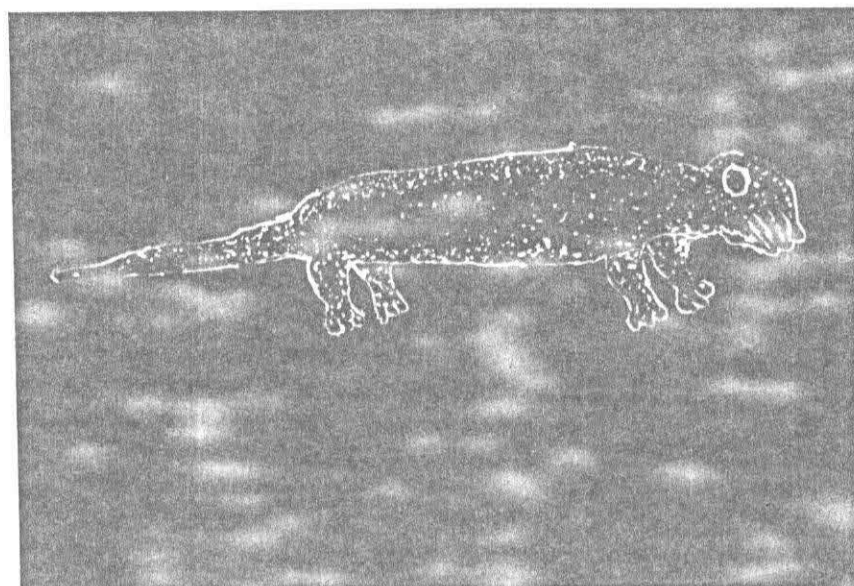


Fig. 16. Di'ā yowā (d. and t.) (= weasel) constellation. Appears ~~on~~ in July and August.

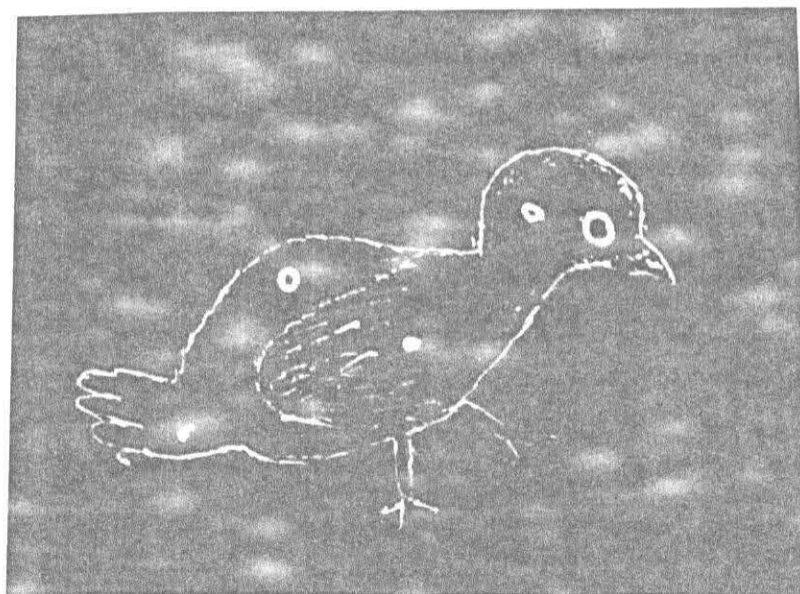


Fig. 17. Bihpiā dianā (d. and t.) (= birds, very pretty) constellation. July, August.

wahsun pẽ yũkũ (d), wahsõ pẽ (t) (= cunuri, trunk). Then comes the larva that eat tururi (Sterculia sp.) leaves: wahsun'bulo ãn (d), wahsõ kẽ ãã (t), or "tururi, larva". Both trees grow on well-drained ground (terra firme) with sandy or clay soil, as well as in the floodlands (igapõs). These first larva are gathered when the nkãn turu (d) or "star, piece" constellation returns after its first appearance in May. This larva gathering is thus called nkãn turu iwẽ yalã (d), ndikon terõ yu'u yalã (t). They disappear by July.

In August the Desãna start cutting down virgin forest to plant new fields. They also clear underbrush in old fields (capoeiras) which can be burned right away vis-à-vis "primary" forest. The first larva gathering ends, and the Indians start gathering a second wave of the same two kinds of larva. Many people participate especially to catch the cunuri larva, which is abundant. The tururi caterpillars are less common even though the associated tree is abundant throughout the Rio Tiquiẽ area.

Another delicacy appears in August: the bali'i (d), bat'ãã (t) or japurã (Prisma japura) tree larva. It eats the leaves of the japurã tree which, like the cunuri, has an edible fruit. ----->

→ During the same cycle, the bihpĩsa (d), supĩsa (t) (= acariquara tree) caterpillar matures enough to be caught for eating. This species eats leaves from the acariquara tree (Minguartia guianensis), which supplies houseposts for the Desãna. Its fruit is un-edible.

Another larva called sit'ha (d. and t.) appears at the same time. It also eats cunuri leaves and is caught on this tree. ----->

→ Another edible larva that matures this time of year is called po'ã burã (d. and t.) (= "fuzzy"). It also eats cunuri leaves. Like the sit'hã (d), it is not as popular as either the cunuri-eating nihtĩã (d) or the japurã eating caterpillar. ----->

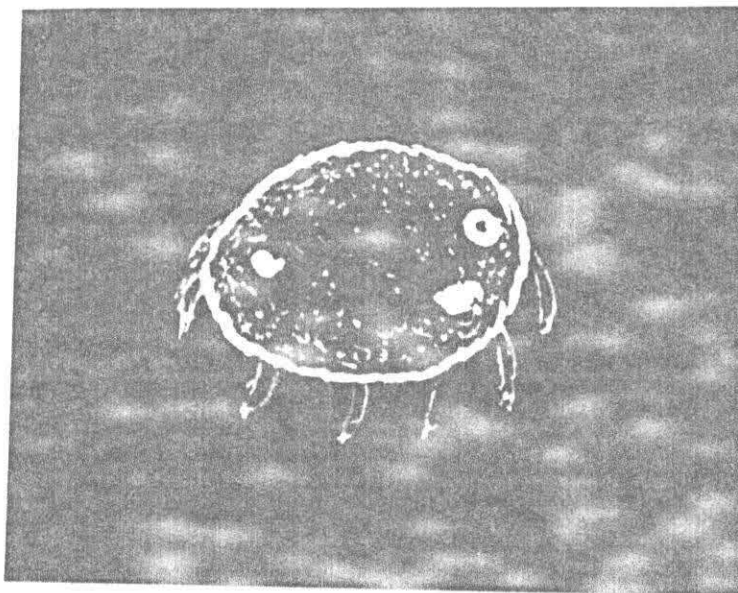


Fig. 18. Ngamiã dianã (d), ñamiã dianã (t)  
(= crab, very pretty) constellation.  
July, August.

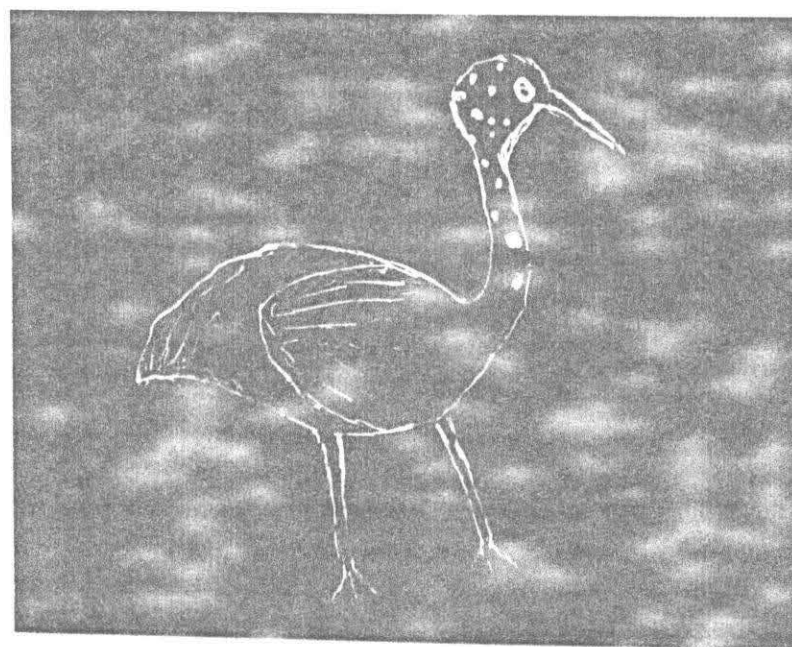


Fig. 19. Iahí puerō (d), iehē puerō (t)  
(= crane, flood) constellation.  
September.

→ The last caterpillar to mature eats ingã leaves (Ingã spp.). This is why ingã fruit trees are planted near fields and inside the villages. It is called behebu (d), menē sīpanuá (t). The ingã caterpillar was identified as a member of the Noctuidae family.

These are the main edible caterpillars. Their cycle occurs mainly in August. Since the rivers run high and it is difficult to fish except with hook and line, caterpillars are an important dietary item at this time of the year.

During the larva cycle there are more paca (Cuniculus paca) in the area. These rodents (se'nē, d. and t.) eat fruit that ripens along the riverbank in June, July and August. According to an aboriginal inter-tribal division of labor, the Desãna had the prerogative to hunt them and exchange them for fish with the Tukãno.

There is a short two or three day spell in September called i'i m'rá weré (d), i'ia' b'k'ena k'ema (t), which means "larva, old, summer". This dry spell marks the passing of the first larva to appear in July: the nihtiã (d) from the cunuri tree and the waku'bu'lo'in (d) from the tururi. During these ten sunny days, the Indians burn the underbrush cut down in August. The Tiquié river drops and the floodlands start draining.

After this short dry spell, it starts raining again and the "sloth" cold wind current returns. The gusts of wind knock blossoms off the star apple (abiu) and ingã fruit trees planted in the fields and around the houses. Following this cold front there is a five-day dry spell called in dianã weré (d), ina' dianã k'ema (t) (= larva, pretty, summer). Underbrush is burned during this dry spell in old fields and the last larva are eaten.

Following this dry spell comes another rain, called ishí puró (d), iché puró (t), which means "crane, flood" (fig. 19), corresponding to the constellation of the same name. The last flight of the maniuãra

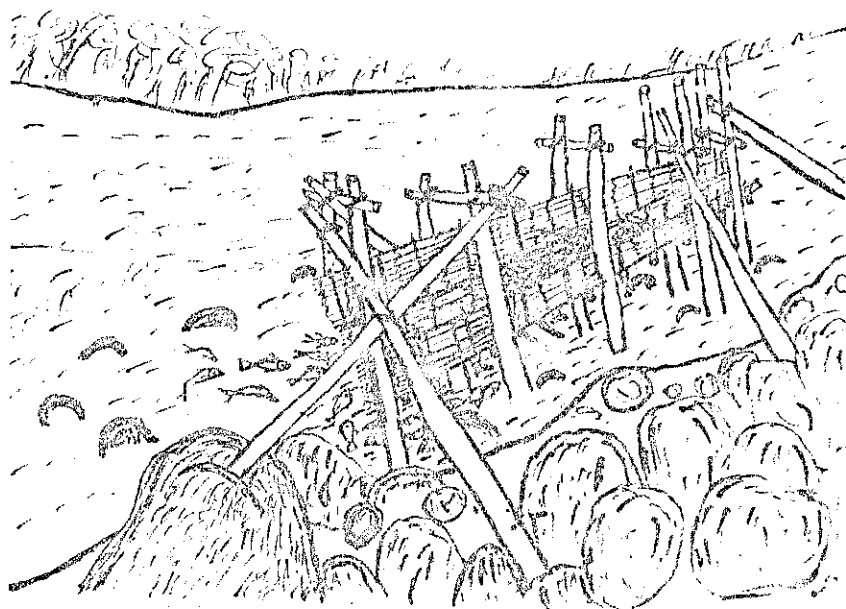
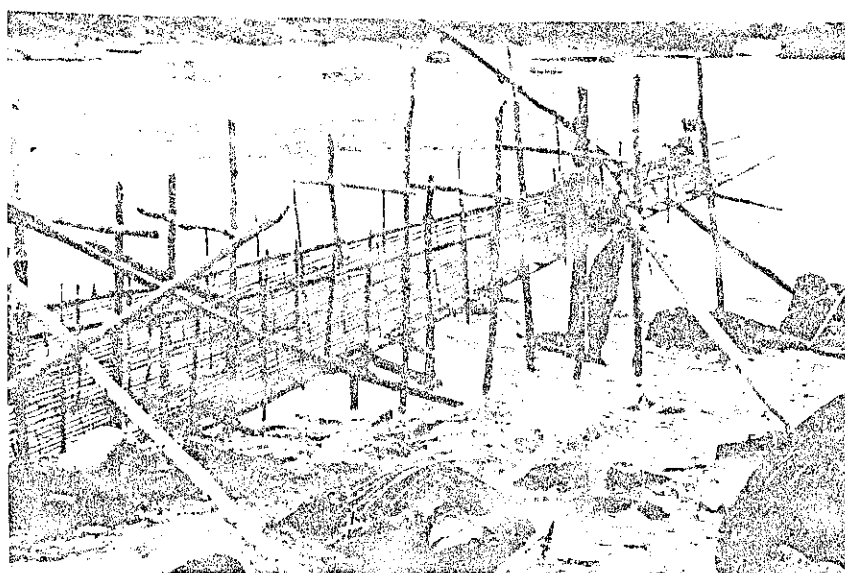


Fig. 20. Caiã (ge'ã, d., e'wã, t.). Fish trap near Pari rapids, headquarters of the Salesian Mission at the Tiquiê river. Compare with photo below.



Caiã photographed by Janet M. Chernella.  
Courtesy of the author. Pari-cachoeira,  
1981.

ants, called porã mangã (d), pohtã mehkã (t), or "thorn, maniuãara) occurs at the same time.

After this rain, at the end of September, there is a five day dry spell called porã wêrê (d), pohtã kêmã (t), or "thorn, summer". Then comes intermittent rains. Wherever the underbrush has not been burned by this time it is impossible to clear the fields, because weeds start growing up and there are not enough consecutive sunny days to complete the burning.

#### The fish cycle: Rio Tiquié

When the "pit viper tail" constellation appears in November, a rain falls until the following month, when the first spawning of aracu, pacu (characid fish), mandi, surubim (catfish) and other fish occurs.

During the ingã dry season, in January, when the river drops, the men begin preparing and setting their large dip nets (jererês). At the same time, the caiãs (ge'ã /d/, e'wã /t/), the largest of the permanent traps, are repaired or rebuilt near the rapids at this time of year (fig. 20). On the Rio Tiquié, there are caiãs at the Pari rapids (Tukãno Indians), Periquito rapids, Cabari stream (where there is a Tuyũka village), as well as at the Caruru rapids, near the Tukãno village by the same name, and the Pedra Curta rapids, by the Tuyũka village called São Pedro.

There is a one-day aracu fishes spawning at the Pari rapids in April, when the yê polerô baxô (d) (= jaguar, tail, round) constellation comes out. This event is marked by a peculiar sound: the fish "scream". After spawning, aracu fish swim downstream and are caught in the caiã trap. Those who helped build the trap split the catch. On normal days, whoever gets to the trap first keeps the catch.

The caiã traps fish swimming both upstream and downstream. The trap breaks the current, so that the fish swimming upstream tend towards this slower-moving water and end up falling onto the trap's mat. Fish



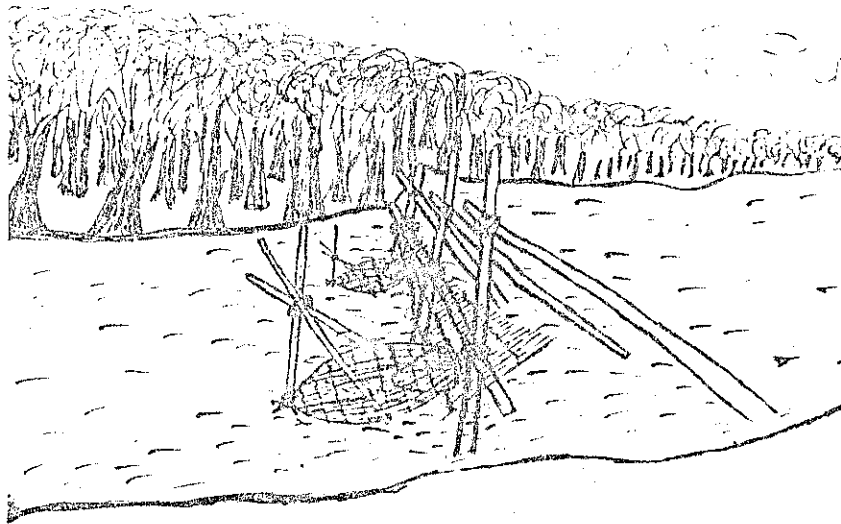


Fig. 21. Jequi (alubo, d., bëhkawë, t.) with an  
internal funnel, surrounded by dikes and  
other devices set on a stream.

going downstream try to swim around the trap, and since they cannot resist the current they swim back and get caught the same way.

Large fish like surubim, pacu, aracu, mandubé, mandi, and others as well as smaller fish like pirã-mirim, already mentioned, are caught in the caia. A mat with a fine mesh is set over this trap at the right time for catching these smaller fish. Both the pacu and the fish called wai'iu soãra (d), waisu soãra (t) (= fish, red jaw) eat the caruru plant (Mourera fluviatilis) which grows in the rapids and from which the Indians once extracted salt. These two kinds of fish are caught in greater numbers where this plant grows.

The jequi, a fish trap with an internal funnel, called alubo (d), bũkawũ (t), is set where the kind of aracu fish called ñihtin ieri-kena (d), ñihtin peritina (t) spawn (fig. 12). These aracu have two black spots on their tails, live in larger streams, and spawn in the floodwaters in certain places along the Rio Tiquié. This species of aracu spawn during the day, around four in the afternoon. They spawn after the spawning of the aracu with black stripes on their tails. The latter inhabit the Tiquié river itself, but spawn in certain bends in the river. The black-striped aracu are called ñihtin manikêna (d), ñihtin manintina (t). These spawn at night, during the rain, a day before the black-spotted aracu spawns.

Aracu is the Indians' preferred fish, and because of its peculiar habits, the jequis to catch them are set in specific places. The Tukâno from Bela Vista set them in the Umari stream, while the Tabatinga and Inspetoria Tukâno set them in the Castanha stream. Both the Umari and Castanha are tributaries of the Tiquié. It is easier to set these fish traps in the streams (igarapês) or narrow side river channels (paranáas), than along the river itself or in the floodwaters, where it is harder to locate spawning sites when the river rises.

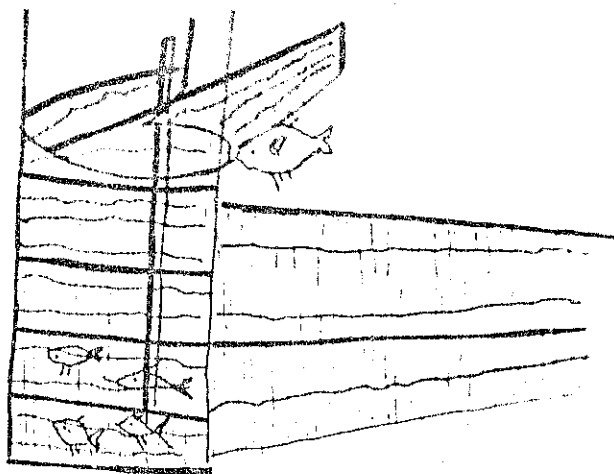


Fig. 22. Cacuri (wāi'rō, d. and t.). Fish trap and dike (pari) set on a river side near the village of Bella Vista, Rio Tiquiê. Compare with photo below.



Cacuri photographed by Janet M. Chernella, Rio Tiquiê, 1981. Courtesy of the author.

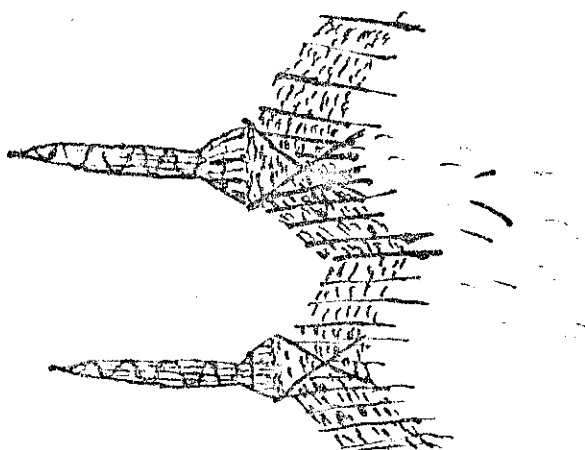


Fig. 23. Matapi (téli, d., kasawë, t.). This kind of fish trap is set on given places along the floodlands fixed with branches and foliage.

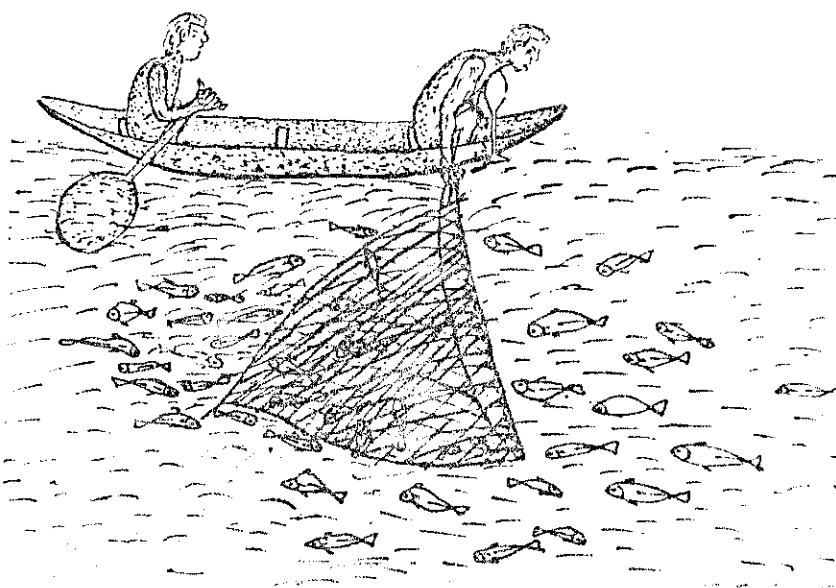


Fig. 24. Jererë (wëheli wahsuni këri, d., wëhenkë wahsuni tikë, t.). Night fishing in a canoe during the aracu (nihtin manikëna, d.) spawning.

These special spots belong to the "older brothers" of each sib and go by the name of the trap, that is, alu ká (d), bēnka ká (t), or "jequi, trap, fence". The best spots are at the Tukâno villages along the Rio Tiquiê. Sometimes smaller fish are caught in these traps when they swim through the rapids in shoals from July to September.

The cacuris or wái'rô (d. and t.) are set in the rapids, in special narrower spots in the floodlands (igapôs), along the river's edge, and in the narrow side river channels (paranáas) (fig. 22). They are set in spawning sites, passed down from one generation to the next, in the Iauaretê and Ipanorê rapids on the Rio Uaupês. →  
→ Cacuris are also set in the Rio Tiquiê, but not according to spawning seasons. Still the best spots, which have been discovered by trial or error over years, are taken by the eldest sons and handed down from one generation to the next. Except for at the Ipanorê rapids, the names of these sites do not take the suffix "ká". Both cacuris and caiás may be considered permanent traps and are repaired during the ingã dry season.

Another kind of fish trap, a long tube with a widened mouth called tēli (d), kasawé (t), is also prepared during the ingã dry season, in January (fig. 23). This kind of fish trap is set in the branches, foliage, and other natural props in special places along the floodlands (igapô). These spots are also handed down from fathers, the best ones to the eldest sons, and subsequently, to younger sons. The Indians locate these places by trial and error and not according to spawning seasons. Sometimes smaller fish like aracu, mandi and acarã get caught in these traps when they swim upstream in shoals, from July to September.

Another important fishing device is the dip net (jererê) (fig. 24). Like the jequi, it is used to trap aracu (nihtin ierikena, d.)

which spawn at four in the afternoon. Both species of aracu are found in all of the spawning migrations corresponding to the constellations referred to here.

When the striped-tailed aracu (ñihtin manikēna, d.) spawn, at night, the whole village gets together to fish in canoes with jererēs. The Indians paddle upstream in the middle of the current with the big dip net dragging underwater. When they have caught a load of fish they dump the catch into the canoe and dunk the net in the river again. They keep paddling upstream and repeat the same operation until the spawning is over.

Aracu and other fish spawn at the first bend in the Tiquiê river below São João, the Tolamãñ Kenhíri sib's village. Another spawning spot is in an inlet below the Pari rapids, headquarter of the Salesian Mission and Tukãno village. Each stretch of the river has a spawning place. This is why the dip net fishing technique is used by the Indians wherever spawning occurs. Men, women and children help paddle the canoes and catch fish.

During the aracu spawning, other fish, notably pacu, mandubē, surubim and mandi, also reproduce. Besides these, peixe-espada, pirandira and jandiã also spawn in shoals. Pirapucu spawn separately where the jauari palms (Astrocaryum jauari) grow in floodlands. Piranha, acarã, traíra, tucunaré, jacundã, among other fish, spawn individually rather than in shoals. Acarã and tucunaré reproduce during the ingã dry season; the traíra and piranha in the pupunha (peach palm) dry season.

During the longer dry spells occurring between the constellations mentioned above, the Indians do tingüijadas, or fish poisonings. A large dike (pari or imíka in d. and t.) is built to close off the paranáas (side channels), lakes, small streams (igarapés) or floodlands wherever the latter are round enough, and the water level is

low. Large dikes (paris) are built before the floods anticipated by the "pit viper tail", "armadillo femur", and "shrimp" constellations.

Two species of fishpoison are used. The wild ones (miãdeka yasali, d., neripu yasasê, t.), probably Derris sp. and Paullinia sp., are native to the area and grow in the floodlands. The stem is crushed and the resulting foam is spread out over the water<sup>6</sup> to poison the fish. The fish surface in a matter of minutes and are trapped, or netted by men, women, and children. Another kind of fishpoison (ni'a melên, d., chũ, t.), probably Tephrosia sinapu, is planted in the fields. The root of this vine is crushed and mixed with clay. The mixture is dissolved in lakes, streams, paranãs, or bends of the river to poison the fish, which comes to the surface and are caught in the same way described above. The former kind of fishpoison can only be used in lakes.

In the latter half of April, during the rains corresponding to the constellations called yê disikã poalõ (d<sup>1</sup>) (= jagor, jaw, beard), it is fruitless to fish with traps, nor do the Indians build dikes to poison the fish, since they know there will be no more dry spells. The only way to fish is with hook and line, to catch a little fish called daguiru. The bait is a black worm, daracubi (bahpalo, d., bahnã, t.) which lives in certain spots in the floodlands. When the river rises, the daracubi crawl up the tree trunks and hide in orchids, where the Indians capture them. The Desãna use another method for catching daguiru when the river level drops during the longer dry seasons. They dive under water in search of rotten logs, where the fish eat mud on the river bottom, and catch them with their bare hands.

When the river rises in June, the little fish mentioned above, the pirã-mirins (imika, d., se'ngã, t.) appear. These fish are caught in caiãs set in the rapids (when they are not set underwater), in jequis and in another special kind of fish trap called iminõ (d. and

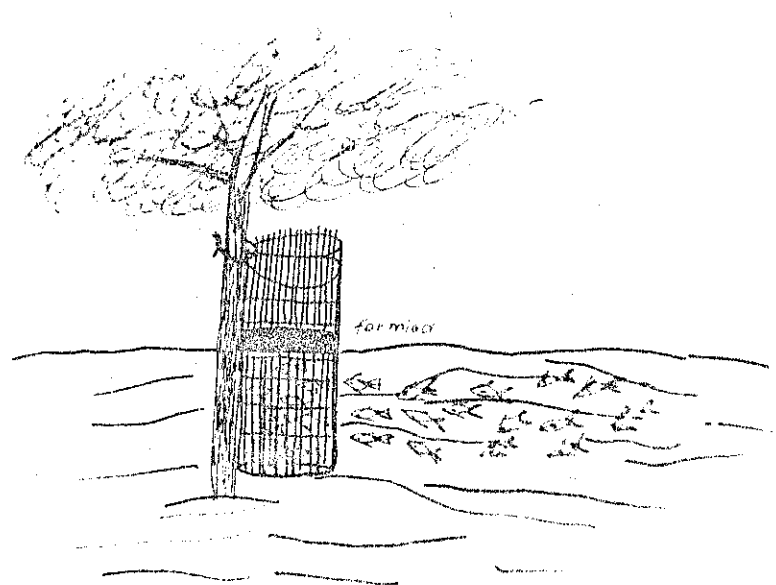


Fig. 25. Fish trap iminō (d. and t.) tied to a tree inside the floodlands. It is provided with a termite bait.



t.) for which there is no term in língua geral. The bait used is a kind of roasted ant (moneterô, d., kahkã, t.) set on a leaf over the iminô trap (fig. 25). In order to catch the pirã-mirins, the fish traps caiãs are set with a finemeshed mat in which the sticks are set close to one another.

Shoals of larger fish like surubim, pacu, aracu and others migrate upstream in June. They are seen most frequently in the rapids, where there are specially reserved places for catching them with caiãs and cacuris. Sometimes they are caught with hooks or by harpoons under torchlight, at night. These shoals of fish are collectively referred to as i'in wái in Desãna, which means "larva, fish", since the migration occurs during the caterpillar-gathering season, in August. This migration, in which these particular fish do not spawn, lasts from June to September and goes by various successive names: "rain wahtin" (supernatural forest dweller), "fish, leaf" and "tree, fish". Beginning in September, the river falls again, the floodlands dry up, and the cycle begins anew.

Manufactured fishing nets were introduced into the area in 1979. Since then, these shoals of fish and the spawning migrations have become more and more scarce. The fish are caught in the nets before they reach spawning age.

#### The edible invertebrate cycle

The first flight of the maniuãra termites (mençã, d., mehkã, t.) (Cornitermes sp.) occurs in December along with the first spawning of aracu, mandi, pacu, surubim and other fish. It is called ni wahkini koara (d), which may be translated as "peach palm, scratching, washing". These termites build mounds with multiple entrances and exits. They are caught in the following way: the Indians make a

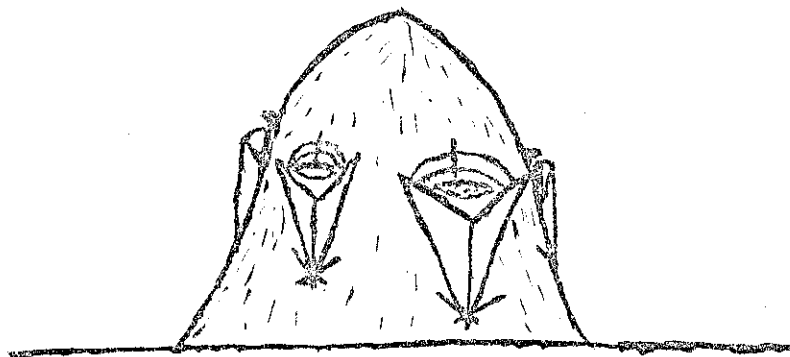


Fig. 26. Mode of capturing the maniuāra (mengā, d., mehkā, t.) ant: a funnel is introduced into the natural termite mound.

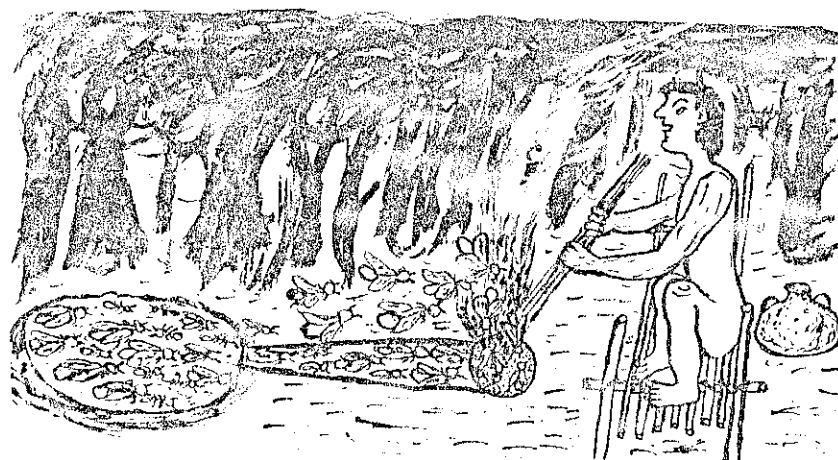


Fig. 27. Mode of capturing "nocturnal ants" (ñamí mengā, d. ñamí mehkā, t.): the ants march towards the hole where a recipient is placed, attracted by the light of a turi torch.

funnel with a leaf similar to the sororoca (Heliconia sp.) and insert it into the natural holes in the termite mound. They make a sort of cup with a fold sororoca leaf and fasten it to the funnel with strips of patauã palm (Jessenia bataua) leaf petioles. When the maniuãras take flight, they collide with the top of the funnel and fall into the sororoca cup (fig. 26).<sup>3</sup>

This operation is repeated at the end of the peach palm dry season, in early April, when the nahsín kamë (d) (= shrimp, constellation) appears and the termites take flight a second time. In mid-April there is a third flight of these termites, corresponding to a constellation which goes by their name, mengá mën puiró (d) (= maniuãra, flood), while other termites also take to the sky. The fourth and final maniuãra flight occurs during a rainy season marked by the constellation yé poleró beiró (d) (= jaguar, tail, round):

Since the maniuãra flights coincides with some aracu migrations, they used to be bartered: the Tukãno went fishing while the Desãna captured termites. Soldier termites are eaten either raw or roasted and crushed in a mortar with salt and pepper. Sometimes the Indians add smoked fish and this mixture is spread over tapioca (manioc starch) cakes. Queen termites are eaten in the same fashion, but without smoked fish.

Leaf-cutter ants (Atta spp.) are also highly prized by all of the groups in the area. Two species are eaten. The one called dihputiara (d), dihpotiara (t); a small brown ant, is eaten either alive or roasted. The Indians eat both the male and female ants. The other kind, small, black and more fierce is called biaponã (d. and t.). These can be kept for a long time by smoking them.

The leaf-cutter ants take flight when the females are ready to lay their eggs, when the "shrimp constellation" rain arrives. The Indians set up a perch over the ant colony and catch the ants with

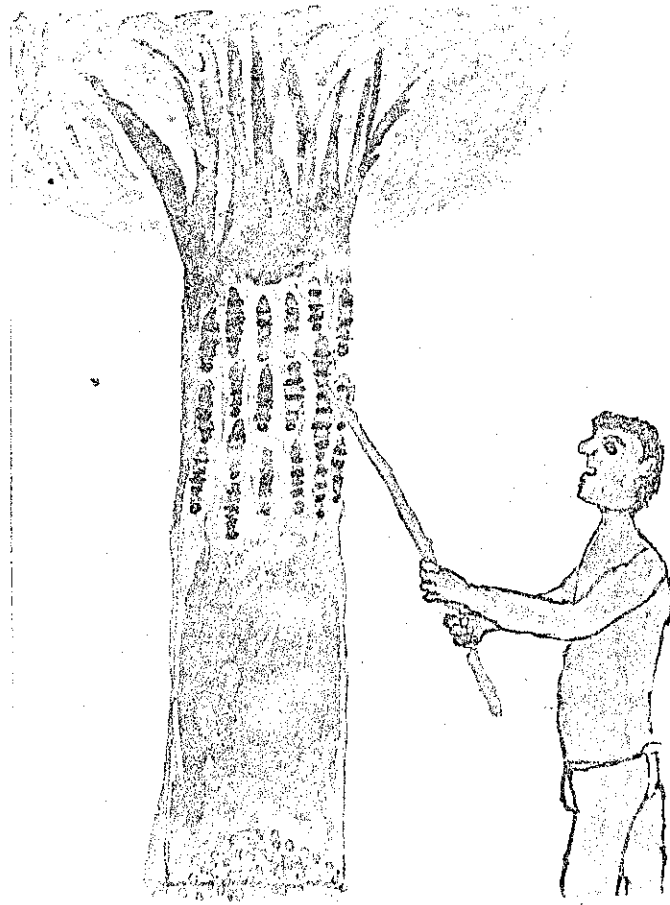


Fig. 28. Mode of capturing the cunuri caterpillar:  
wahsubulo in, d.

their bare hands when they fly out of the hole. Their cycle ends in mid-April, when the "round jaguar tail" constellation appears, after the umari fruit dry season.

The "nocturnal" ants (ñanĩ monqã, d., ñanĩ mohkã, t.) (= night, ant) mentioned above also take flight during the "shrimp" constellation rain. Like the leaf-cutter ants, they built their colonies underground. They fly out of the hole at dawn and are caught using a torch made of turi (Licania sp.), a kind of volatile wood.

"Nocturnal" ants are caught by digging a hole three meters away from the ant colony and cutting a clean, straight groove between the two. They then light the turi torch, which attracts the ants, which march towards the hole where a receptacle is placed to catch them (fig. 27).

Termites take flight during this same season. Two species are known: ahpikõn wẽka (d), ahpekõn we'ã (t), and bulu paganã (d), buhtu pakanã (t). The first build their colonies underground or in rotten, fallen logs. The second are tree-dwellers and build larger colonies. The colonies are built with clay. The Indians eat only winged, egg-laying females, not males.

Grasshopper collecting occurs in July, before the "otter" constellation appears. The Desãna either roast them in clay pots and crush them with salt and pepper, or smoke them on a spit, as they sometimes do with small fish.

The first larva appear in late July along with the "crab" constellation and subsequent cool front. The caterpillars that live on tururi trunks (wahsu'bulo ñn /d/ = tururi, larva) appear in limited numbers. As they reach maturity, they grow larger and crawl down the trunk into arm's reach. They are then caught, boiled in salt and water, and eaten. The tururi larva are 10 centimeters long, smooth, with pink and black stripes (fig. 28).

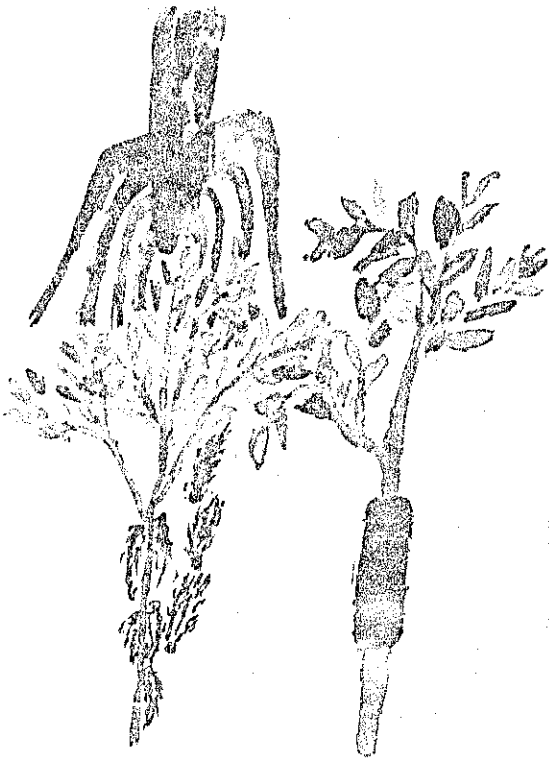


Fig. 29. The cunuri larva (nihti'ā,  
d.) pile on neighboring tree  
branches to build its nests.  
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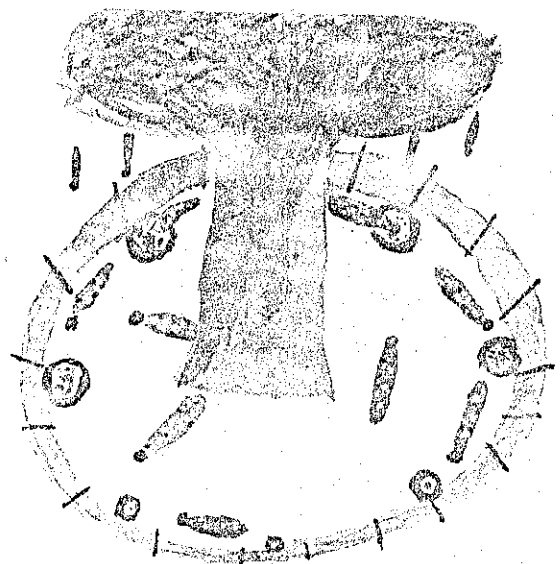


Fig. 30. Japurā caterpillar (bali'i, dug  
d.). A round trench is dug  
around the trunk with holes at certain  
intervals where the larva is caught.  
are caught.

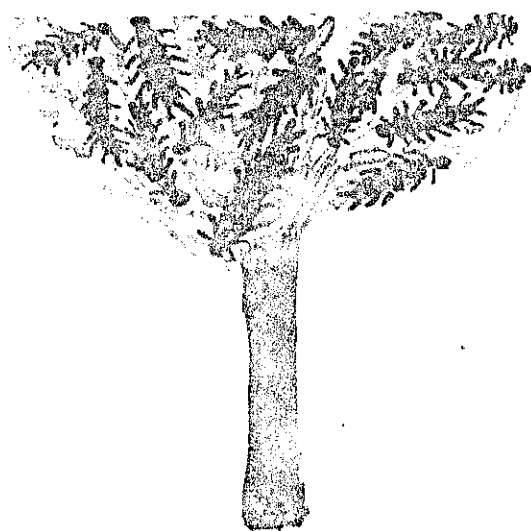


Fig. 31. Larva that eats the leaves  
of the acariguara tree:  
bihpisa, d., suhpisa, t.

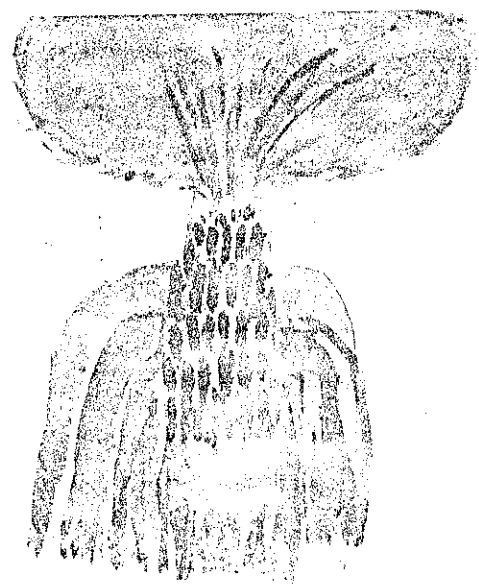


Fig. 32. Larva Sit'a (d. and t.)  
eats leaves of the cunuri.  
When mature, it crawls down the  
tree into arm's reach.

The cunuri larva are also caught by hand when they crawl down the tree trunks in groups and pile up on neighboring tree branches. They are six centimeters long, grayish in color, with whitish fuzz. These larva, called nihti'ã (d. and t.), are roasted, crushed in a mortar with salt and pepper, and eaten over tapioca cakes (fig. 29).

In order to catch caterpillars on the japurã tree, which is about 20 meters tall and one meter in diameter, the Indians dig a trench around the trunk and line it with cabari (Derris sp.) leaves. At given intervals in the trench, they dig a hole, which they also line with cabari leaves. The caterpillars fall off the japurã trunk around noon. They crawl around the trench until they fall into the holes. These larva are called bali'i (d), bat'iñã (t) (= japurã). These japurã caterpillars are blue with tiny white spots, have no fuzz, and measure some 10 centimeters in length. The Indians know when they are about to fall off the trunk by examining their droppings on the ground (fig. 30).

The japurã caterpillars are highly prized, not only because of their excellent flavor, but also because they have a gland that secretes enzyme the Indians use to remove warts. This gland is removed before boiling the caterpillars until they are soft enough to eat. They are also prepared by roasting, crushing and then mixing them with salt and dried capsicum peppers.

A kind of orange caterpillar with white fuzz, called bilpísa (d), suhpísa (t) (= acariguara) also appears in August. These larva eat the leaves of the acariguara tree. The acariguara caterpillars have a sweet taste and are prepared the same way as the other species mentioned above (fig. 31).

The next kind of caterpillar to mature is one that eats cunuri



leaves, as does the nihti'ã. Like the tururi caterpillar (wahsu'bulo in /d/), it feeds at night and crawls down the trunk into arm's reach when it matures. It is 4 cm long, has brown skin and fuzz, and is called sit'ã (d. and t.) (fig. 32).

Another species, called po'ã busã (d. and t.) (= "fuzzy") matures in August. They eat cunuri leaves, are 10 cm long, and have whitish skin length (fig. 33). A kind of yellowish fuzzy caterpillar, 10 cm. in length, called wahsun pẽ ĩn (d), wahpẽ i'nã (t) (= cunuri, larva) (fig. 34) crawl down the cunuri trunks and are caught in the same way as the nihti'ã larva. Finally, at the same period, appears a caterpillar that eats both native riverine ingã leaves and those of cultivated ingã fruit trees. It is called behebu (d), monẽ sipamã (t), measures 4 cm in length and is yellow-dark with white fuzz (fig. 35). These caterpillars can also be captured in the cocoons they spin on neighboring trees. They are also eaten by birds, which explains why fewer of them crawl down the tree trunks. Some kinds of larva, like the japurã and others, use their saliva to spin individual cocoons on the ground in order to protect themselves. The ones that do not get eaten turn into butterflies.

As mentioned before, the Indians also eat certain species of mushrooms. The ẽ'iri (d) (Auricularia delicata Fr.) are cooked in a fish and pepper sauce (quinhapira). Taka (d) mushrooms are grated, cooked, and mixed with fish to thicken the stew. The largest kind, similar to white sponges (Poliporaceae) are roasted in the same clay pot used to toast manioc flour, and then mixed with salt and pepper and rolled in a banana leaf, as some kinds of tapioca cakes. (7)

### Conclusions

This chapter tries to demonstrate how the Desãna perceive their annual economic cycle to be linked with the atmospheric/celestial one. Main points are: first, the Desãna's year begins in October. Second, the dry seasons are quite short; they reach fifteen totally rain-

free days at most. Third, rainy seasons are directly related to the stars' positions in the sky. In other words, these rainy seasons correspond to the appearance of given constellations and have the same names. They are associated with the annual economic cycle. Hunting, as a subsistence activity, is not included in this atmospheric/celestial cycle. For one thing, game used to be provided for the river-dwelling Tukâno groups mainly by the interfluvial Maku Indians. The only exception are pacas (Cuniculus <sup>mostly</sup> paca), which are hunted/at a given time of the year when they feed on certain kinds of fruit that ripen then. Fish spawning, on the contrary, are all closely related to the constellations and rain cycles.

This chapter also implies the nutritional importance of ants and caterpillars, as a complementary source of animal protein. The Indians knowledge of the invertebrates' morphology and habits shows up in their detailed taxonomical classification. Their awareness of spawning and feeding of fish, combined with accurate fishing practices, augments fish catch in black waters, normally low fish, which make up the protein basis of Indians' diet (Chernela/1983, 1986). Manioc, the staple crop and main source of carbohydrates, is also related to the stellar cycle, since the rainy and dry seasons coincide with the farming cycle.

The Desâna's terminology for constellations may not coincide with the Western classification, but it reflects the climatic reality of their habitat: alternating rainy and dry seasons and the rise and fall of river levels. The Desâna's astronomical and meteorological observations belie the notion that there are only two main seasons in the region, a rainy season and a dry season, or "winter" and "summer". They also go beyond the simplistic Western classification of Amazonian soils, which are usually described as

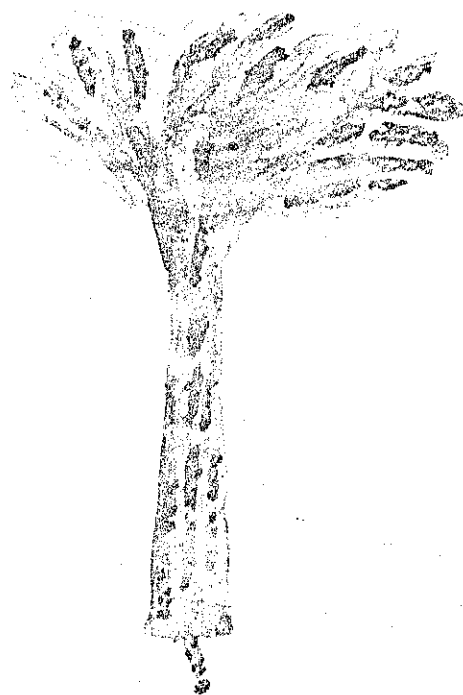


Fig. 35. Larva behebu (d), menē sipamā (t): larva  
yellow with black fuzz, eats ingā  
leaves.

well-drained ground (terra firme), meadows (campina) and riverbeds (várzea). They have an elaborate taxonomical classification for the numerous ecosystems that occur in their territory.

It is important to note that the stellar cycle bears little relationship to the Desâna's ritual calendar. In former times, prior to the "pit viper constellation" rains, from October to December, the kumiã (= wise men) held rituals with smoke and tar to ward off the poisonous snakes that are more common and more venomous at this time a year. The tar ritual is thus called shã dibuli (d) or "pit viper, ward off". Since the Desâna clear forest for planting at the same time, the smoke ritual (wêre kéri, d.) protected the Indians against falling tree trunks. From July to September, when the edible larva cycle occurs along with the respective constellations, the Desâna performed exorcisms to defend themselves against supernatural sorcerers. The male initiation rites were held when certain rare and highly-prized fruits, like uacum (simiô, d. and t. = Monopteryx uacu), miriti (nê, d. and t. = Mauritia flexuosa, and wahsun (d), wahsô (t), a kind of rubber fruit, probably cunuri (Cunuria spruceana), came into season, along with the appearance of the yohôka dêhpê puiro (d) (= adze feathered ornament) constellation.

Desâna named constellations are consistent with those reported among the Barasana, a Tukâno group of Colômbia, by Stephen Hugh-Jones (1982), and among two other groups, of the same linguistic stock, of the Uaupês, by T. Koch-Grünberg (1905). Not always do they refer to the same stars, though, and among the Desâna, they do not figure in myths. In this, and in all other cases, they are linked primordially to the economic calendar. This brings up the conclusion that indigenous knowledge of atmospheric/celestial cycles should also be considered in understanding ethnoecology in Amazonia.

Notes

- (1) Whenever possible, we give the Desâna (d) and Tukâno (t) terms with their literal translations. Desâna is the author's Tolamãn Kenhíri mother tongue, belonging to the Tukâno linguistic group, and Tukâno is the língua franca in the area.
- (2) These edible frogs (Leptodactylus and Osteocephalus spp., probably) stay in ponds in the igapós before they flood.
- (3) See below the classification, characteristics, and mode of gathering insects and other edible invertebrates.
- (4) Term in língua geral: modified Tupi-Guarani language introduced by the Jesuits into Amazonia during the 17<sup>th</sup> century, afterwards replaced by Portuguese. There are several species of daguirus with names in Desâna and Tukâno.
- (5) According to S. Hugh-Jones (1982:188) "This elbow-shaped constellation represents the stone-bladed adzes that were once used as agricultural implements and then as ritual ornaments worn over the left shoulder when dancing but that have now disappeared completely". To this author, this constellation, named sioruha, in Barasana language, corresponds to the belt and sword of Orion (*ibidem*).
- (6) There used to be otters (Lutra sp.) in the Tiquié river, but they were hunted so much for their pelts that they have fled the area.
- (7) Prance (1986) listed among the Yanomâmi 26 edible mushrooms.

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