

MCDB 150 Global Problems of Population Growth Lecture 2 Notes

Notes and slides from Lect 1 are posted in Resources section of the classes web site.

Bulletin Board:

1. New York Times NYT 1/14/09 SLIDE 1

On Tuesday (1/13/09), I described cases of men throwing acid mixtures on women's faces as an extreme form of battering. The next morning I open the New York Times (1/14/09) and there, center top of the first page, the main story is about men throwing acid in the faces of Afghani girls to keep them out of school. However, school is so important to them that a girl reported "My parents told me to keep going to school even if I am killed." We will talk in a later lecture about the crucial importance of education in changing levels of childbearing."

2. From a student in this class DUNG BEETLES SLIDE 2

"I have to let you know that dung beetles are among my favorite animals.
The best part is watching the male agonize over rolling the ball over to the hole while the female rides, relaxed, just planting her eggs inside it.
The ultimate feminism, if you ask me!"

The student wishes to remain anonymous.
Probably doesn't want you all to think that she's kinky.

SUMMARY of Lec 1:

In essentially all species - eggs are rare and expensive - sperms are cheap and abundant.

The evolutionary game for males is to gain access to eggs.
Males compete for females either by sperm competition or by fighting with other males.
Female strategy is to either gain resources or choose the mate w/ the best genes.

Males and females collude in making this a violent game.
Females, following their evolutionary interest try to be picky in choosing a mate which means that the males must compete – either to show the females that he has the best genes or to physically fight the other males this leads to greater size among the males

This greater size of the males allows male on female violence.
It leads to physical domination of the females

In primates, and the great apes in particular, this rarity of eggs is carried to an extreme. One characteristic of our line of evolution is an enormous and long lasting investment in the young.

This investment is mostly by the female. So each female may be available for insemination only once in 5 to 10 years.
Tremendous competition for the few females who are available for insemination.

Each great ape species has evolved different ways of competing for females.
3 of the 4 non-human species have evolved violent means.
Bonobos have evolved a peaceful mechanism.

Orangutans think they are cute:

SLIDE 3

And use all sorts of techniques to appeal to members of the opposite sex.
Here's a story of a female using intellectual brilliance to attract a mate.

In 1978 a graduate student came to the Orangutan research station in Borneo.
He taught an adult female sign language.
The student's name was Gary Shapiro and the Orang was Rinnie.
She was really a brilliant student.

Gary could not believe how fast Rinnie learned the language.
Rinnie took all the attention personally.
One day Rinnie took Gary by the hand and tried to seduce him.

Gary pushed her away.
There is no wrath like the wrath of a woman scorned.
She thereafter lost all interest in signing and ruined his thesis project.
Birute Galdikas quoted in NYT 3/21/00

Last time I was describing how the females advertise their estrous with a swollen red rump. The males congregate around her and a lot of violent competition ensues.

Within this sexual melee - each male is trying to get as many copulations as he can.

In the community studied by Jane Goodall, every male may get had intercourse with a female during each of her estrous periods.

This degree of promiscuity ensures that, at the time of fertilization, there will be sperm from more than one male in the female's reproductive tract.
This ensures that there will be a lot of sperm competition.
One can measure sperm competition by calculating the ratio of testes weight to total body weight. In Chimps the ratio is 10 times larger than in humans. NATURE 437 (2005) p58

However, sexual access is very unequal.
A male's success is determined largely by his place in the dominance hierarchy.

In a small troupe with 4 males, the alpha male may do 3/4 of the copulations,
Not only does he achieve the most copulations, he gets them at the best time during the female's cycle.

The remaining 3 males share (unequally) the other 25% of copulations.
Less dominant males have fewer copulations and at less opportune times.

A male's place in the hierarchy determines his reproductive success.
The access to females is very unequal.
Because of this inequality in reproductive success, evolution pushes males to spend extraordinary amounts of effort competing for status.

Chimps spend most of the year establishing and maintaining status.
Most of that time, no female is in estrous.
The males spend only minutes actually engaging in intercourse.

The males fight for position in the hierarchy. When a chimp wants to move up in the dominance hierarchy - there may be a long period of jockeying for position - with great big displays and threats and hostile gestures - but eventually a real fight will eventuate.

Jane Goodall describes one of these. Sherry, a younger male, was moving up the hierarchy. He had beat out some of the lower ranking males. The next one on his list was Satan. Satan was not the alpha, but was higher than Sherry. They had a huge fight: when it was over, Sherry was

bleeding from bad wounds on his shoulder, both hands, his back, his head and on one leg. Sherry escaped and ran away screaming loudly.

This was apparently such a bad experience that Sherry never thereafter attempted to dominate other males.

The general rule seems to be that all kinds of threats and displays that do no bodily harm can serve to maintain an existing dominance hierarchy, but reversals always require a severe fight.

In the wild the loser runs away. The fights don't result in death.

But in captivity the fights are sometimes lethal:

DeWall describes one fight where the loser had one ear gone, the other torn, his hands and feet badly mauled with several bones exposed and some fingers and toes missing. A gash stretched from one shoulder to the opposite hip.

Despite emergency surgery from humans - he died.

It seems that Chimp brains have evolved to value status almost as much as life and death.

The behavioral mechanisms whereby Chimps form their relations with other chimps are exceedingly complex.

With males it involves friendly behavior as well as hostile behavior.

Males sometimes establish especially friendly relations w/ individual females. They may groom them, give them food, support the females in their disputes with other males. If he is successful in this, she may collude in allowing him to have intercourse without alerting the alpha. She may also support him in dominance conflicts with other males. Female support is often critical in determining ranking in the hierarchy and who becomes alpha male.

The males also form bonds with other males by spending a lot of time grooming them. They then use these bonds to form coalitions so that two low ranking individuals - each of which is individually lower than the α - can, when together, outrank the more dominant male.

Goodall p 313:

"Goliath arrives in camp alone, late one evening. Every so often he stands upright to stare back in the direction from which he has come. He seems nervous and startles at every sound. Six minutes later three adult males appear on one of the trails; one is high ranking Hugh. They pause, hair on end, then abruptly charge down toward Goliath. But he has vanished silently into the bushes on the far side of the clearing. For the next 5 minutes the three crash about the undergrowth, searching for the runaway.

"Early the next morning, Hugh returns to camp with his 2 companions. A few minutes later, Goliath charges down, dragging a huge branch. To our amazement he runs straight at Hugh and attacks him. The two big males fight, rolling over, grappling and hitting each other. It is not until the battle is already in progress that we realize why Goliath, so fearful the evening before, is suddenly so brave today: we hear the deep pant-hoots of David Greybeard. He appears from the undergrowth and displays in his slow, magnificent way around the combatants. He must have joined Goliath late the evening before, and even though he does not actually join in the fight, his presence provides moral support. Suddenly Goliath leaps right onto Hugh, grabbing the hair of his shoulders, pounding on his back with both feet. Hugh gives up; he manages to pull away and runs off, screaming and defeated."

Chimp social behavior is extremely complex and manipulative. They know each other individual in the community and have a unique relationship w/ each one.

They know how each one is likely to react in a given situation and they know how to manipulate each other into providing help in certain situations, or to letting them get away with something that the other chimp would normally object to.

You will read a lot about the great range of social cleverness and manipulation that chimps can do in the De Wall: Chimpanzee Politics selection in your reading.

STATUS

Status is NOT simply male size and aggressiveness. It is a cooperative phenomenon. The whole chimp group determines who is their leader. The males make friends with each other, they form coalitions with each other, they betray each other. The males curry support from the females. The females will often play a large part in kingmaking. If a male's behavior is unacceptable other chimps will simply turn their backs on him, or walk away. He will be shunned and isolated.

No matter how strong, a single male is, he can not maintain the alpha position without the support of the rest of the community.

Learning about each individual and socially manipulating may require more intellectual capacity than other tasks of the Chimp brain.

It can be hypothesized that humans became so smart in order to succeed at social manipulation. Of course, language is the supreme means of social manipulation and is also the most distinctive aspect of human mental capacity.

Now when the sex behavior of chimps was first being observed -

the observers saw the apparently utter promiscuity of the females

It was initially presumed that the females didn't care who mated them.

That was very surprising - because females should evolve to be able to choose the best father.

Now a new interpretation is evolving.

Infant and juvenile chimps stay with their mothers and are ruled by them. The infants and juveniles are smaller than the adult females - so any adult female can discipline any young. So, with rare exceptions, any adult male will dominate any adult female (when each is alone w/o allies) and any adult female can dominate any young.

But as the males reach adolescence, they go through a growth spurt and eventually reach the size of an adult female

Then they reverse the dominance relationship w/ each female. They systematically brutalize each female in turn. The females resist, but the male is more aggressive and gradually is bigger. The male charges at the female, hits her, kicks her, pulls her off balance and jumps on top of her. She huddles and screams, but he continues to slap her, lift her up and slam her onto the ground and then he charges off again.

In subsequent years, way after the male has gained dominance, males will often attack females with similar ferocity and w/o apparent provocation.

<http://www.mc.maricopa.edu/dept/d10/asb/origins/apeswrath.html>

Nearly 20 years ago I spent a morning dashing up and down the hills of Gombe National Park in Tanzania, trying to keep up with an energetic young female chimpanzee, the focus of my observations for the day. On her rear end she sported the small, bright pink swelling characteristic of the early stages of estrus, the period when female mammals are fertile and sexually receptive. For some hours our run through the park was conducted in quiet, but then, suddenly, a chorus of male chimpanzee pant hoots shattered the tranquillity of the forest. My female rushed forward to join the males. She greeted each of them, bowing and then turning to present her swelling for inspection. The males examined her perfunctorily and resumed grooming one another, showing no further interest.

At first I was surprised by their indifference to a potential mate. Then I realized that it would be many days before the female's swelling blossomed into the large, shiny sphere that signals ovulation. In a week or two, I thought, these same males will be vying intensely for a chance to mate with her.

The attack came without warning. One of the males charged toward us, hair on end, looking twice as large as my small female and enraged. As he rushed by he picked her up, hurled her to the ground, and pummeled her. She cringed and screamed. He ran off, rejoining the other males seconds later as if nothing had happened. It was not so easy for the female to return to normal. She whimpered and darted nervous glances at her attacker, as if worried that he might renew his assault.

In the years that followed I witnessed many similar attacks by males

Having established his dominance, the male can ever thereafter coerce the females into sex.

Usually then, the physical violence occurs at a time quite separated from an act of intercourse. Because of this time separation – this mechanism of domination should be distinguished from rape.

“Battering” is probably a better word.

When many males congregate around an estrous female. there are many males who are dominant to her. She cannot really resist any of them.

But, If a dominant male catches a female 'monkeying around' w/ another male

- the dominant male will often attack the female rather than the male.

Why? Well, if he goes off and fights with a male - it may be long and distracting.

Meanwhile he leaves the female unguarded, and a third male might sneak in and complete a copulation.

It's not the male who wants to copulate at that moment who inflicts the violence. So, again, it is not rape, but battering.

Bonobos

It doesn't have to be that way.

Chimps live North and East of Congo river

West & South of Congo river there is another species: Bonobos.

Genetically equi-distant from human as Chimps are.

Chimps and Bonobos look so similar that scientists didn't even realize that they were different species. Early writings on how peaceful chimps were - were really from studies that had bonobos as their subjects.

Completely different behavior.

No Gorillas - therefore more food density. Food available all the time.

Females can travel together. They protect each other.

Males are peaceful.

Grow large testes.

Sperm competition.

Size of testes in Great Apes SLIDE 4

Gorillas:

Silverbacks monopolize females. When a bachelor steals a female (rare), copulations of the two males will be separated by days or weeks.

No chance for sperm competition.

very small testes 1X

Orangutans

Rape (not all that rare) separated in time from desired copulation

Occasional chance at sperm competition.

small testes 2.7X

Humans

Not as rare now as we might like to think.

Historically (evolutionary time scale) - unknown?

Intermediate size 3.4X

Chimpanzees

A lot of promiscuity, but still an alpha male

large 15.3X

Bonobos

Wow! very large 19.7X

HUMANS

You've seen 4 different models for male-female relationships.

Rape in Orangs

Infanticide in Gorillas

Battering in Chimps

Total promiscuity in Bonobos.

Which one most closely resembles the human condition?

Rape occurs but is relatively rare.

Infanticide by males against the wish of mother is even rarer.

Battering is extremely common.

Wife Beating: Stud in FP 9/98 pp300 ff:

Punjab, North India:

75% of scheduled caste women (lowest castes) reported being beaten frequently by their husbands.

75% of men report beating their wives.

BanglaDesh: 47% of the women report having been beaten.

A study of 10 countries ranging from Japan to Ethiopia showed that in most sites between 30 & 56% of (ever partnered) women had experienced BOTH physical and sexual violence. Int'l FamPlanPerspect March 07 p40-41.

Probably these are underestimates in our terms - because, in an area where 75% of women are beaten frequently, local standards for what constitutes frequent and severe beating must be much more violent than ours.

In South India or in higher caste surveys, the number goes down to 22%.

Collusion:

Wife beating is widely accepted - both by women and their husbands - as a husband's right and a woman's due.

40% to 80% of wives agree that a beating is justified if a wife neglects household chores or is disobedient.

Very little difference between Hindu and Muslim women (in the North) on this question.

Severe beating is uniformly justified and condoned for many reasons, including, for example, a woman's disobeying her husband's orders.

They recognize that woman may not prefer to do it the husbands way - therefore the disobedience - but, nevertheless, it is proper behavior and her duty to obey her husband. When she gives in to "selfish" instincts, she deserves to be punished.

US: from PIERS Video (7/19/00) 50% of US women will be physically abused by the men with whom they live. 6 million will be battered. That is more than rape, auto accidents and muggings combined.

A Palestinian Woman: " Men have small brains. If you feed them, cook for them, and clean for them, maybe then they will not beat you."

Sara Doorley Population & Habitat Update 9/10-'99 (Nat'l. Audubon Soc.)

I have been describing to you the way the Chimp social system handles sex.

There is something very wrong – or at least incomplete - with the story.

I've emphasized how the males, throughout their whole lives, spend a huge amount of time and energy, in order to be the male who gets the 1 or 2 inseminations available in any given year.

They will fight for status
– even to the point of suffering severe physical injury or death.

But whoa! I also described Chimp's sexuality as very promiscuous. Every time a female comes into estrous she engages in a hundred bouts of intercourse – and every male in the community is included.

It doesn't make sense.

Why doesn't the alpha male just kill or kick out all the other males and keep the harem all for himself?

The answer to this is the story of Jane Goodall.

SLIDE 5

Jane Goodall was 23 yrs old in 1960. She had always loved watching animals. Hadn't been to a University and had no career. Invited to visit friend in Africa.

Took a job as a waitress to save up money.

She took a boat to Kenya in 1960. for biographical info, see: www.janegoodall.org/jane/

Louis Leakey: 1960: Are you committed for 10 years?

"Had we stopped after a mere 10 years - we would have observed many similarities in their behavior and ours, but we would have been left with the impression that Chimpanzees were far more peaceful than humans."

It actually took 25 years before the full range of Chimp aggression was observed.

Starting in 1962 Goodall started observing a group of 19 adult and adolescent males together with their females and young.

Goodall tracked their social relations

For instance: two best friends were Goliath and Jomeo -

They had very friendly interactions during the 6 years they were observed.

Gradually separated into 2 groups which came into less contact.

One group spending more time in the southern valley

- the other in the Northern valley,

Northern Subgroup: 8 fully mature males

Southern Subgroup: 6 fully mature males

Males started traveling only in groups when in each other's territory.

Attacks over 3 YEARS (1974 to 1977).

One day, 6 Northern males were observed traveling together
The chimps heard calling in the South Moved quickly and silently in that direction

GODI - a Southern male feeding in a tree - noticed them, jumped down and ran away - but Humphrey chased after him and tackled him.

- pinned down his legs AND hands - sat on his head, pushing his face into the mud
then the others attacked - Gashes on face, nose, mouth
- punctures in leg and in ribs.

Godi was eventually beaten so badly that he was motionless.

Then the attackers just left -

Godi wasn't quite dead yet - but close to it and died shortly thereafter.

7 weeks later. 3 males attacked DE.

De ran up tree, and then started escaping by jumping from tree to tree -
but a branch cracked and he was left hanging
they pulled him down.

The 3 males kept beating him - he huddled up - then lay flat on the ground
- no longer even trying to escape - the females joined in.

They dragged him, faintly squeaking, along the ground.

Skin was torn from his leg with the teeth.

Lived for a few months - spine and pelvis protruding -
scrotum shrunk to 1/5 normal size HE DIED.

A whole year passes. 5 males attack GOLIATH, an extremely old male.
with teeth worn down to the gums.

Jomeo, who had been his "grooming partner" !for 6 years! partakes of killing.

Goliath was beaten for 20 minutes - tried to protect his head
but gave up and lay still - not protecting self -

The adolescent males, who up to then had been whooping it up on the periphery - but were afraid
to attack - they ran in - hit the victim -
then ran away again.

Goliath died.

2 Years and 3 months pass - a party of 5 males Killed Charlie

Finally 3 years after first kill -the Northern males caught Sniff

Satan grabbed him by the neck and sucked blood from his nose.

2 males grabbed one leg each and dragged Sniff down into a ravine.

Again the attackers left before actual death - but Sniff died soon after.

SNIFF WAS THE LAST MALE.

The females were not spared:

Madam Bee, a crippled female and her daughter Little Bee - both in estrous were attacked.

A series of attacks on her over the course of a year.

In the last attack - after she had stopped moving -

Jomeo picked her up slammed her down - stomped on her rolled her over and over along the slope

Then he let her go - but when she tried to get up another male came in and slammed her to the
ground and beat her again until she was motionless.

She died 5 days later of the wounds.

Eventually the Southern Group was totally wiped out.

Update from Understanding Chimpanzees, 1989

The Kasakela victors expanded into the newly vacated areas in the south.

This lasted a year.

Then they came into conflict with the next community to the south

- the powerful Kalande community (with at least 9 fully mature males).
In the next year they were not only driven out of their newly won territory,
but pushed even North of their "pre-war" boundary.
In the meantime, another community in the North was pushing southward.
3 adult males vanished one-by-one. Possibly the victims of attack.
A 3 year old disappeared
A 1 year old infant disappeared - the mother was seen after w/ wounds.

Only 4 fully adult males were left.
The range of the community had shrunken from 15 km² to ~8-9 km². (Just over half what it had been).

Jane worried that her whole community - the Chimps she had studied for 20 years, would be wiped out.
Fortunately, some of the adolescent males grew up and strengthened the group
things have now stabilized with 7 adult males with a range of ~12 km².

Since the groups have more or less the same number of adult males, neither can dominate the other.

So there is peace:

The Kalande groups are not seen chasing the Kasakela males back to the center of their range.
Rather when neighboring males encounter each other near the periphery of their range - they give terrific calls and displays
and then both discreetly retreat back towards the center of their range.

Not Exception

Nishida 1985 Group Extinction and female transfer in wild chimpanzees in the Mahale National Park, Tanzania. *Z Tierpsychol.* 67:284-301. quoted in Ghiglieri 1988 p258-9.

" During the second decade of observation
all 6 adult males of the smaller community (K-group) containing 22 members, vanished one by one
apparently due to aggression by the males of the other two much larger neighboring communities,
who were dominant because of their size.

One after another the females of the annihilated community transferred with their surviving offspring
(with the notable exception of most of the adolescent males, a few of whom actually wasted away
and died) to the victorious M-group who also annexed much of the defeated K-group's territory."

They gained much more of the two resources which most limit the reproductive potential of males:
adult females and good territory in which to raise offspring.

Definite signs of prior intent to attack:

Patrolling: p490

Earlier the same day 2 or more adult males (possibly w/ some females) leave the core area of their range and travel purposefully toward the periphery. They observe absolute silence. They avoid treading on dry leaves and rustling the vegetation. On one occasion vocal silence was maintained for more than three hours. They move in a compact group and travel cautiously. There are many pauses while they gaze around and listen. Sometimes they climb tall trees and sit quietly for an hour or more, gazing out over the area of a neighboring community. They are very tense and at a sudden sound (a twig cracking or a leaf rustling) they may grin and reach out to touch or embrace each other. If a youngster makes a sound, he will be reprimanded.

From Mariko Hasegawa (♀, 40s, 4'10") in Mahale mountains.

The night before Usually chimps congregate somewhat closely at night, in a different place every night - and locate each other by using pant-hoots. On a particular night, Hasegawa noticed that the troupe did not engage in pant hooting. She had never experienced that to happen before.
The next morning, the troupe attacked a neighboring troupe. Singled out a mother and her infant

and attacked and killed them. Hypothesis: they were silent in the previous night so that the victim troupe would not know where they were. Further hypothesis - there must have been intent (even group intent) to attack the night before and in order to arrive at this decision, they must have been able to communicate this intent or plan.

Clearly, these are planned Attacks with foresight
long attacks
gang attacks
cooperative attacks held down by one - hit by others
continued for 3 years
The purpose of this warfare is not at all clear.

One possibility is that the Chimps get more territory and therefore more food.

The fig trees they live off come into fruit kind of randomly. So the chimps patrol their territory looking for trees that have fruited. So they must have a big enough territory to ensure that there is always at least one tree in fruit when they are hungry.

In the dry season, there may be some scarcity of food, but usually not.

In fact, Jane Goodall makes a point of saying that:
most of the time, finding food is no problem.

JG (p231): "There is a wide variety of plant and animal species which provide an adequate -- usually plentiful-- supply of food. Food tends to be more abundant during the lush wet season, but healthy chimps have no difficulty finding enough to eat during most dry seasons. Occasionally, however, crops are poor at this time and chimpanzees, especially the old and sick, may suffer as a result.

In one piece of research (p236) Jane Goodall's group followed an adult male, Figan, for 50 days. He never appeared to search for food, Typically he just returned to foods eaten on the same or a previous day. Sometimes, in his travels, he came upon "new" food - that is those that had become ripe or ready to eat since he was there before; these were then incorporated into his diet. Sometimes a chimp, as he is traveling around, just happens to see fruits that have fallen on the ground He may eat 1 or 2 of these - look up into the tree - and if he sees more - climb up and start to feed."

After the war, the Northern Chimps got more territory -- but did they need it? They were getting enough food and enough nesting space from their old territory. In fact they were able to get enough food from a much smaller territory -- the one remaining to them after the second war -- enough in fact so that they were able to expand again.

In droughts, the problem for the old and sick is tramping through the territory and then climbing the trees to get the scant food. It's not clear that more territory would be helpful at all - since the problem seems to be enough energy to search even the territory that is normally held - and neighboring territories are certainly going to be in the same drought that your territory is experiencing.

So there is little evidence that the Chimps' pre-war territories were not large enough. However, most Chimp watchers now think that food is a key resource.

Anne Pusey, Jennifer Williams: Top ranking females in Gombe have twice the reproductive success of lower ranking females.
They have better ranges with more food.

The second possibility is that the purpose of the wars is for the males to acquire fertile females.

But, in these raids, fertile females are killed
- even those in estrous and therefore sexually fertile and receptive.

So war is not an immediate sexual strategy.

Like all species, Chimps have a problem with inbreeding.
This is severe in a small group.
In different species, one sex or the other goes out.
More common for it to be the males who go out.

In Chimps, the females sneak out of their home community
In one small study 54% (7 of 13) children were fathered outside the community.
Science 8/8/97 p774-5
This is called exogamy.

Young females who have never had babies (nulliparous) can move freely between neighboring communities. The males greet her peacefully, but if she tries to run away, she may be chased and mildly attacked. But it is the kind of behavior that is aimed at starting a consortship (a dating relationship) with the female.

But if the female has mated and already has a child, then the response is violent. 76% of the encounters are aggressive and 14 or 15 of the actual attacks on older females were extremely severe. (Story of attack: JG pg 502)

It seems that fully mature females don't have the same appeal for males that young virgin or at least nulliparous females do.
And that's even if the mature female is well within her breeding years.

In fact the young females seem to be able to come and go between groups as they wish.
So it's not clear that a war is necessary to attract them.

Female Chimpanzees typically copulate several hundred times per pregnancy Science 8/8/97 p774-5. Most of these copulations occur within their own group. Yet half the fertilizations are by out-group males. How does this happen? Females may have some mechanism for controlling who is the father. Maybe they are aware of their fertile times and at just the right time sneak away to the neighboring community. There are many things we don't yet know!

Humans are another species that practices exogamy. In ~70% of human societies, it is primarily the females who move out of their birth community to mate. In the minority of cases where males move out, the distances are small and they retain ties with related males of their birth community. Goldsmith p309. Gillis, Tilly p179; Europe 17thC: " 'marriage migration' was quite local, and female." Marriage was exogamous and the female moved.

It is possible that the numbers of Chimps are now greatly reduced by human predation. Maybe, in a previous time, the population density of chimps was high enough that they were crowded and did have to fight for territory. Once that behavior is evolved in, it may become self-perpetuating. So if a large group will always attack a smaller group- then it is always wise to try to keep your neighboring groups as small as possible - so attack them at any opportunity. If you don't keep their numbers low - they will attack you and wipe you out. So independent of the need for food - the chimp groups will be required to make pre-emptive strikes to prevent the other group from doing the same thing. The behavior has become self-perpetuating - independent of the need for food or territory.

In short we don't know the reason for these wars.

(The proper term is 'lethal raiding'. I use 'war' to highlight the apparent continuity with human warfare – wait for next lecture).

However, we can at least sketch out a hypothesis of how the whole social system evolved and what maintains it

If the alpha male totally monopolized the females, evolution would cause the other males to either 1) become constantly aggressive so that fighting for dominance would take place almost all the time or 2) leave the group altogether and try to form their own group.

A group that started evolving in this direction would have fewer males, or less cooperative males, and they would be quickly wiped out by their neighbors.

The apparent promiscuity of the females is what holds the social organization together. The male does not keep total control over the estrous females and thus every male has a chance to be the father of any infant.

The male cannot fight a neighboring community alone. He needs to have allies. He pays by allowing his allies some chance of reproductive success.

Sequence of evolutionary causality is

- 1) Each group engages in warfare with the groups that neighbor it.
These are wars to the death.
- 2) Success in these wars depends very strongly on the number of adult males in the community. Thus there is a need for many males.
The social organization must keep the males in the community.
Males can't be killed in intra-community dominance fights
- 3) Evolution will only allow the subordinate males to remain in the group if they have some chance of reproducing.
Dominance of the α male can't be absolute
The mating system is thus promiscuous.
As a result, paternity is uncertain
- 4) Males physical competition leads to males being larger than females.
This allows males to coerce females into sex.
- 5) Since paternity is uncertain, males must be protective of all young
- the infant may be their own.
Story of infant biting scrotum of alpha male.

It's because the battle between the males cannot be decisive that the males continue the battle with the females.