HUMAN PARTURITION
Does It Require Social Assistance?

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ABSTRACT

Human parturition is compared to that of other primates with the view to critically examining Trevathan's (1987, 1988) hypothesis that human beings require a midwife during parturition because of unique human physical and physiological traits. The supposed vast differences, both biological and social, between human childbirth and nonhuman primate parturition are questioned, using historical, ethnographic and fossil data. It is concluded that many of the complications associated with the human birth process may be the result of the Western practice of giving birth lying down, and that a midwife is not an obligatory adjunct to childbirth.

RÉSUMÉ

La parturition humaine est comparée à celle d'autres primates afin de faire une examination critique de l'hypothèse de Trevathan (1987, 1988) qui propose que les humains ont besion d'une sage-femme pendant la parturition à cause de traits physiques et physiologiques particuliers aux humains. Les grandes différences biologiques et sociales présumées entre l'accouchement humain et celui des primates sont remises en question en utilisant des données historiques, ethnographiques et fossiles. On conclu que la pratique occidentale d'accoucher à plat dos est la cause primaire de complications associées à la parturition humaine, et que la présence d'une sage-femme n'est pas obligatoire pendant l'accouchement.

INTRODUCTION

It has been repeatedly demonstrated in anthropological studies that "the course of human evolution has been characterized by two trends; one for increased brain size, and the other for the increased efficiency of bipedal locomotion" (Leutenegger 1981; Lovejoy 1988; Passingham 1975; Trevathan 1987:21). Both of these traits directly conflict with childbirth, as the pelvis has re-aligned, resulting in a decrease in the size of the birth canal, and the cranium has become larger (Leutenegger 1981; Lindburg

1982; Trevathan 1987, 1988). These opposing forces are thought to have led to the development of the extreme difficulty women have giving birth today.

Wenda Trevathan (1987, 1988) examined human parturition mechanisms and their implications. She suggested that four main factors influenced the development of this uniquely arduous birthing process characteristic of modern humans. These included not only selection for bipedalism and encephalization (Leutenegger 1981; Lovejoy 1988), but the broad, rigid shoulders found in all hominids, and the tendency for the fetus to be born facing away from the mother.

Trevathan (1988) asserts that human infants are born in the occipital anterior position (i.e. facing away from the mother) because the evolution of bipedal walking in *Homo sapiens* reoriented the human pelvis, and thus the neonate must now undergo rotations during delivery. Unless the infant is born facing away from the mother, the uterine contractions necessary for cervical dilation would injure the fetus' spine; therefore, humans are born in the occiput anterior position. Trevathan further argues that women would be unable to aid themselves by pulling the infant out because "this action would pull the infant backward, risking injury to it in the process" (Trevathan 1988:90). The conclusion is that natural selection would have acted heavily upon females who sought social assistance during labour and delivery. Trevathan hypothesizes that this need for women to have social assistance during childbirth is unique to humans and that this requirement was the foundation of the development of human social groups (Trevathan 1987, 1988).

I: GOALS OF STUDY

This paper will critically examine Trevathan's theory that the human requirement for the obligate midwife during parturition is unique to humans, due to novel physical and physiological traits, through an examination of a number of different aspects of human birth. The mechanisms and social aspects of human parturition will be compared to that of other primates. Birthing positions and their relationships with parturition duration and complexity will be considered through a comparison of human and nonhuman primates, as well as the fossil, ethnographic, and historic evidence on human birthing.

HUMAN BIRTH: PHYSIOLOGICAL AND CULTURAL ANALYSIS

I: THE PHYSIOLOGY AND MECHANISMS

Human labour and delivery can be divided into three different stages. The first includes cervical dilation; beginning with the onset of contractions and ending at full dilation, when the cervix is no longer felt as distinct from the lower uterine segment. The slower, early portion is referred to as the latent phase, lasting on average eleven hours for primiparous females and seven hours for multiparous females. The faster, later segment, is known as the active phase. This typically lasts between one, and one and a half hours (Trevathan 1987:65).

The second stage involves the complete descent of the fetus through the pelvis. In this stage the fetus is expelled from the uterus. Contractions are stronger and more frequent and the woman characteristically feels the urge to bear down. This expulsive effort involves the abdominal muscles and the diaphragm. It lasts from between half an hour for multiparous women, to one hour for primiparous women (Trevathan 1987:65).

The final stage begins at delivery and ends when the placenta is expelled, an action usually completed in approximately fifteen minutes (Trevathan 1987:65).

Although many factors have been associated with the starting of parturition (i.e. decreased progesterone levels, excessive amniotic fluid, placental aging, biorhythms, and increased oxytocin and prostaglandins), the exact sequence of events leading to the initiation of labour remains an enigma (Trevathan 1987; Fuchs *et al.* 1982).

The human pelvis is not like that of other higher primates, due to that fact that humans employ bipedal locomotory behaviour. The pelvis has been realigned throughout evolutionary history. The inlet is widest in the transverse dimension, while the outlet is widest in the sagittal plane. The presenting part of the fetus (usually the head) readjusts so that the largest fetal dimension is relevant to the largest maternal pelvic dimension (Trevathan 1988).

This pelvic structure requires the fetus to change positions during parturition. The series of eight movements the fetus typically undergoes throughout delivery are described below in Table 1.

II: BIRTHING POSITIONS AND THEIR EFFECT ON PARTURITION

Due to the structure of the human pelvis, it is most efficient for women to be in the upright position during labour. Walking during labour

speeds up the first stage and enhances the delivery of oxygen to the fetus. Upright posture increases both the strength of contractions (by up to 30%), and the pressure of the fetal head on the cervix. This increased force on the cervix results in faster dilation and a significantly shorter labour (i.e. 36% for primiparous women and 25% for multiparous women). As well, the pelvic opening is wider when the female is upright. (Calderyo-Barcia 1979; Carr 1980; Liu 1979; Oxorn and Foote 1975; Roberts 1980a, 1980b; Trevathan 1987).

It is also optimal for women to deliver while vertical. This way, the mother's expulsive efforts work with gravity (Calderyo-Barcia 1979; Carr 1980; Liu 1979; Oxorn and Foote 1975; Roberts 1980a, 1980b; Trevathan 1987, 1988).

When the mother is vertical, the presenting part of the fetus is the occipital region. This is the most developed of the infant's cranial plates, thus better suited to bear the force of its body (Liu 1979; Trevathan 1988). If females are supine during delivery, the more fragile frontal bones of the neonate must absorb the body weight. This recumbent position also displaces the fetal head which may prohibit it from entering the pelvic inlet (Liu 1979; Trevathan 1988). Upright delivery posture results in a lower incidence of instrumental births, a decreased need by the mother for anesthesia, and a reduced rate of fetal hypoxia (Calderyo-Barcia 1979; Carr 1980; Lang 1972; Oxorn and Foote 1975; Roberts 1980a, 1980b).

Bauer *et al.* (1983) in a study comparing the various postures and their effects on parturition, found that the supine position yielded the worst results, in that it had the lowest contraction efficiency in dilating the cervix and the highest maternal discomfort level.

Oxorn and Foote explain that the tradition of a horizontal position for labour and delivery was developed by obstetricians to aid in dealing with complications, and administering drugs to relieve pain. "This may not be best for normal deliveries" (Oxorn and Foote 1975:129).

In 1738, Francois Mariceau, a French obstetrician 'decided' the recumbent position was easier for forceps deliveries. To this day women in many parts of the world give birth lying down because of Mariceau's arbitrarily developed tradition (Calderyo-Barcia 1979; Carr 1980; Lang 1972; Liu 1979; Roberts 1980a, 1980b). Previously, and dating to antiquity, women had given birth squatting, crouched, seated on an obstetrical stool, or upon the lap of another woman (Lang 1972; Liu 1979). Calderyo-Barcia (1979:10) writes that

> The horizontal position is not natural or convenient for labour. It causes well-known, ill-effects, such as the compression by the uterus against the spine and the inferior vena cava, aorta,

> iliac arteries and ureters. This pressure completely disturbs the maternal circulation and the output of urine. Disturbances of the maternal circulation have an unfavorable and distressing effect on the fetus.

Compression of the inferior vena cava by the gravid uterus has been widely recognized as a cause of fetal distress (Liu 1979; Roberts 1980a, 1980b). In fact, fetal distress can be lessened and/or eliminated in women who are moved from a dorsal recumbent position to an upright position (Liu 1979:26).

The advantages of the vertical position for childbirth have been well documented in the scientific community, and yet most North American women are still not given the choice to give birth while upright. A final, important benefit to the vertical position during parturition, is that it is preferred by 95% of women, given the option (Calderyo-Barcia 1979; Carr 1980). Thus, it is custom alone that decrees the choice of position for parturient women (Liu 1979; Roberts 1980a).

III. HISTORICAL AND ETHNOGRAPHIC DATA ON CROSS-CULTURAL BIRTHING PRACTICES

The examination of historical and ethnographic literature shows that in the vast majority of cultures past and present, women have given birth in an upright position (Kay 1982; Kunter 1983; Lang 1972; Liu 1979; Roberts 1980a, 1980b). Kunter's (1983:92) assertion is that

> Medico-historical and anthropological studies, sculptures of prehistoric times and early pictographical documents on birthing from various countries prove, that for thousands of years the posture of the body for giving birth was the vertical position. Even today women in various traditional cultures give birth squatting, kneeling, or sitting.

As previously discussed, the western custom of the recumbent position for parturition began in the 1700s, well before the era of modern medicine:

> Cross-cultural comparisons of customs and practices show that within Western industrialized societies obstetrical services often thought of as planned and rational contain many forms of behaviour which are habitual, traditional, and so assumed as to preclude their evaluation (Richardson and Guttmacher 1967:ix).

Until recently, very little information about the birthing traditions of different cultures was available. Anthropologists were for the most part male. Women of the societies these men observed were not keen to discuss their childbirthing practices (Richardson and Guttmacher 1967). In more recent times, since the feminist movement, women have researched parturition customs more intensively, both at home and abroad (Kay 1982).

Cross-cultural studies are essential to understanding the development of human birthing practices (Harris 1987; Michaelson 1988).

> The ease or difficulty of childbirth, the type and amount of human intervention and manipulation, and the corresponding fears and attitudes of the labouring women, and those attending her, can be regarded as an indication of the changing civilizations and cultures of evolving humanity (Lang 1972:np).

It must be remembered that the expression of pain is to a large extent culturally learned and therefore, the amount of pain women experience during parturition is difficult to measure cross-culturally (Michaelson 1988).

Liu's (1979) findings show that throughout the world today the majority of infants are born spontaneously, without operational intervention. For the most part, women still labour and deliver in some form of the upright position. Roberts (1980a:11) found that 81% of non-European societies use upright posture for labour and delivery.

There seem to be some nearly universal aspects to child bearing. In most cultures, women walk and move about in early labour, often even in late labour, and they give birth in an upright position, whether that be kneeling, squatting, standing, or sitting (Michaelson 1988:119). It also appears that in almost every society, women seek out familiar territory for their births where they can relax. In fact, the fear and tension that result from being in a strange place (i.e. a hospital) have been demonstrated to slow down the course of labour (Michaelson 1988:119).

These findings suggest that perhaps a great many of the birthing difficulties experienced by women in industrialized countries, which contribute to the idea, prevalent in the West, that human parturition is uniquely difficult, are actually the result of the so called "medically advanced" practices of the western world (Naaktgeboren 1983; Dunn 1983).

An examination of the ethnographic literature about childbirthing further discredits Trevathan's theory of the human obligate midwife. Women in many cultures do not seek social assistance during parturition, and in fact labour and deliver alone (e.g., see Sargent 1982:208).

Gelis (1991) explains that women can assist themselves during parturition if in a crouched position, which not only adds further to the list of advantages of vertical posture during childbirth, but adds evidence to the cases of women giving birth in isolation.

> It is in the crouched position that which the woman seems to have the least need of help, in which she can herself best watch her perineum and disengage the head of her own baby, if necessary. The crouching position is the one adopted by a woman alone (Gelis 1991:123).

Konrad and Konrad (1983) give the first ever report on the delivery of a primiparous female among the Bime people of the New Guinea highlands. Women in this cultural group labour and deliver in isolation, in the crouched position, just as the above quotation suggests.

Although it is true that the majority of women around the world today do give birth with some degree of social assistance, these cases of women giving birth in isolation demonstrate that midwifery is not a universal phenomenon required by the physical mechanics of human parturition, as Trevathan has suggested. These practices also question theories that humans need the company of others during birthing for emotional support.

THE FOSSIL EVIDENCE

I: INSIGHTS INTO THE BIRTHING PRACTICES OF EXTINCT SPECIES

Tague and Lovejoy (1987) suggest that australopithecines had babies in a different fashion than either the humans or apes of today. The famous Lucy skeleton has one hipbone and the sacrum preserved. From examination of this partial pelvis, Tague and Lovejoy feel confident in asserting that the australopithecine pelvis was widest from side to side. Many authors believe that Lucy's pelvis was adapted to bipedal locomotion (i.e. because it is flat); therefore, parturition would have been more difficult for australopithecines than for modern apes whose pelves are oval (Lewin 1982, 1988; Tague and Lovejoy 1987). At this time (approximately two million years before present), the cranial capacity of these hominids was still quite low, implying that the neonate would have had a significantly smaller head at birth, thereby making delivery somewhat easier than it is for modern, large brained humans. Tague and Lovejoy

propose that the fetus would not have had to undergo the rotations typical of births found in *Homo sapien sapiens.*

Trevathan (1987) argues that early hominid species would also have had laborious births, comparable to that typical of modern humans. She points out that difficult birth is part of the evolutionary history of all higher primates because of the encephalization characteristic of the entire Order. Trevathan (1987) believes that hominid selection for smaller birth canals, as a function of bipedalism, intensified this problem .

Leutenegger (1972, 1973) describes australopithecine births as "quick and easy", predicting the neonate head size to be smaller than the pelvis. Trevathan disagrees, stating that both australopithecines and *Homo sapien sapiens* have the same inclination of the pelvis. This implies that the fetus emerged ventrally and entered the pelvis obliquely or transversely, therefore undergoing at least one rotation (Trevathan 1987:26). Labour and delivery would have become more and more difficult with increased encephalization (Lewin 1982), especially for *H. erectus* and *H. sapiens.* According to Trevathan, this would have intensified the need for social assistance during labour, as well as drastically reducing the mother and the infant's chances of survival if they were alone. Trevathan concludes that natural selection would therefore have acted very powerfully in favour of women who sought help during parturition (Trevathan 1987, 1988).

It has been suggested that the rise in cranial capacity may have led to a necessarily earlier birth, with the resulting helpless neonate typical of modern humans (Trevathan 1987:28). It is interesting to note that poor nutritional status in humans has been linked with flatter pelves (Angel 1978). Although more evidence is required, it is possible to speculate that perhaps the australopithecine's flatter pelvis was the result of nutritional deficiencies, and that parturition was actually quite similar to that of modern humans.

The other hominid group that has undergone intensive investigations in relation to pelvic structure is the Neandertal. *H. sapiens* and Neandertal pelvic remains are identical in overall morphology, proportions, dimensions in relation to body size, patterns of sexual dimorphism, the sacra, the ilia and the ischia; however, all known Neandertal pubic bones are mediolaterally elongated (Rosenberg 1985; Trinkaus 1976, 1984, 1986). Trinkaus has suggested that this elongation of the pubic bones implies that Neandertal had a gestation period of 11-12 months. It is argued that the nine month gestation period of modern humans was selected for mainly because it shortened the interbirth interval, and thereby increased the potential for population growth. Many authors disagree with this theory of the Neandertal gestation lasting for 11-12 months (Anderson 1989; Bower 1988; 1985; Ivanhoe 1985; Rak and Arensburg 1987; Rosenberg

1985, 1986a, 1986b). Rosenberg (1986a, 1986b) demonstrated that the Neandertal elongated superior pubic ramus functioned to maintain a larger birth canal. This would have been necessary because Neandertal were short, heavy people with large heads. This physiological adaptation occurs in modern human populations who have statures similar to those of Neandertals, such as the Inuit and the Mayans (Rosenberg 1985).

Trinkaus' theory on the reduction of the gestation length to nine months in *H. sapiens*, assumes that modern humans evolved directly from Neandertals, a theory which is not well supported in the literature (Bower 1988, 1985). Many researchers argue that the two different pelvic configurations of modern humans and Neandertals have to do with posture and locomotion, not gynecology (Bower 1988; Rak and Arensburg 1987). Ivanhoe (1985) points out that no evidence has been found in *H. sapiens* that a larger pelvis leads to a longer gestation period. Anderson contends that

> The gestation hypothesis as proposed by Trinkaus is actually just a series of hypotheses not supported by any evidence: Neandertals had larger pelvic inlets; Neandertals had larger babies; Neandertals had longer gestations; Neandertals could not keep babies born after nine months of gestation alive; Upper Paleolithic populations could keep the product of a nine month gestation alive; reduction in gestation length increases reproduction rate; reduction in pubic ramus length increases locomotor efficiency; and Upper Paleolithic populations had gestations of nine months (1989:328).

As Anderson so clearly points out, nothing is actually known about early hominid birthing practices and any inferences made are purely speculation. The only thing that we do know for sure is that humans and their predecessors (whoever they were) gave birth successfully. Evolution acted on a large number of factors over an extensive period of time, to create the pelvis characteristic of humans today. How hominid females gave birth is not known, nor is the difficulty that the fetus encountered during its expulsion. It does not seem that the paleontological record can therefore be used to argue for or against Trevathan's social assistance theory.

NONHUMAN PRIMATE PARTURITION: PHYSICAL AND BEHAVIOURAL CONSIDERATIONS

I: NONHUMAN PRIMATE PARTURITION

Nonhuman primate parturition can also be characterized by the three distinct stages used to describe human labour and delivery. Nonhuman primates differ from humans in their delivery sequence, in that the fetus does not have to pass the sacrum and the pubis together, as they are not parallel. Therefore, no bending by the fetus is necessary. As well, both the inlet and the outlet are widest in the sagittal dimension, so no rotations are required. As a result, human infants emerge in front of the ischia, while nonhuman primate neonates are born in a more posterior direction (Trevathan 1988).

Trevathan notes three advantages for nonhuman primates because the fetus' head appears in the occiput posterior position. Firstly, the mother may reach down and pull the infant out. Secondly, the infant may pull itself out. Thirdly, the mother can lick and/or wipe the neonate, possibly to clear its breathing path (Trevathan 1988).

II: IS HUMAN LABOUR UNIQUE?

Some authors suggest that human parturition is not exceptional when accurately compared to that of other primates (Brandt and Mitchell 1971; Lindburg and Hazell 1972). They note that the majority of studies performed on nonhuman primate births have occurred in captivity (see Table 2). Captive births may differ significantly from those of animals in their natural habitat. These births witnessed in nonnatural conditions cannot necessarily be assumed to be indicative of normal births (Stewart 1984).

Leutenegger (1981) argues that human birthing is indeed more difficult and dangerous than it is in other primates, due to increased cranial dimensions. Leutenegger describes nonhuman primate labour and delivery as "quick and easy" (1981:90).

Lindburg (1982) presents a strong case against the theory of the human obstetrical dilemma. As mentioned, he points out that very few wild primates births have been witnessed (see Table 2). It is difficult to "just observe" the birth of another animal. Humans cannot effectively communicate with other primates, and so the early stages of labour may often go unnoticed (Brandt and Mitchell 1971; Lindberg 1982). Some researchers honestly note that they had no idea that the subject was in labour (and often times no idea that she was pregnant!), until the infant was emerging (Sekulic 1982; Stewart 1977, 1984).

Although the labour of nonhuman primates is often recorded as lasting only a couple of hours (Galdikas 1982; Goodall and Athumani 1980; Goswell and Gartlan 1965; Kadam and Swayamprabha 1980; Leutenegger 1981), this may only include stages two and three of labour, when it is obvious to the observer that the female is indeed in labour. The first stage may go unnoticed. Interestingly, as described earlier, stages two and three combined typically last two hours in humans as well. It seems, then, that human labour may not be as different from non-human, as is commonly believed (Lindburg 1982:197). Stewart contends that

> Throughout the primate order, parturition is a very similar process. In humans, however, labour normally lasts eight to twelve hours. Definitions of stages in human parturition are based on measurements of cervical dilation. Lindburg and Hazell (1972) point out that the discrepancy in labour time disappears when one applies the observable criteria used for nonhuman primate to human parturition. By such criteria, human labour lasts about two to three hours, very close to that of other primates (1977:971).

Even within distinct human societies, labour is measured in different ways, implying that much of the variation documented in parturition times may be testing errors.

III: DO PRIMATES GIVE BIRTH ALONE?

Trevathan's human parturition social assistance hypothesis can be tested further by an examination of the literature available on primate births. Do nonhuman primates give birth alone as the theory suggests? Are nonhuman primates able to assist themselves in ways human females cannot?

Table 2 summarizes the literature reviewed with regard to nonhuman primate births. Captive animals were obviously alone while giving birth, so these cases provide no insight as to the natural behaviour of these creatures. Of the ten cases where the females were not forcibly isolated, they remained by themselves throughout parturition only twice. One of these was a premature, breech, stillborn birth of a baboon and may therefore not be indicative of the species' normal parturition behaviour (Nash 1974).

In Table 2 the "Alone?" column distinguishes females that were separated from other members of their group or population. The degree to which the females listed as not alone were actually close to others

varied. In this case, not alone means that the female was within reasonable distance of others to readily communicate, although not necessarily visually.

In many cases other individuals were very close to the parturient mother. For example Goodall and Athumani (1980) witnessed the son of a labouring female chimpanzee examining her vulva throughout the birth. Sekulic (1982) describes the daughters of a howler monkey staying beside, and closely watching, their mother for the duration of her labour and delivery. Abegglen and Abegglen (1976) report on a case where the group leader caught the neonate as it was expelled.

Reviewing the literature on the birth of other primates does not add support to Trevathan's social assistance theory. Human females do not appear to be unique in their tendency to seek the company of others during parturition. It is difficult to imagine how most primates, who are naturally inquisitive and curious about what is going on around them, would stay away from expecting mothers (Leslie Chan, personal communication).

A problem with reviewing such a limited amount of literature on wild births is that it is easy to make conclusions on species-typical behaviour. In reality, there may be no such thing as typical behaviour, and if there is for some, or all species, the sample size used here is definitely not sufficient to make such statements.

IV: POSITIONS FOR BIRTHING

Table 3 illustrates the different positions of the nonhuman primate females during parturition. Any incidence where the actual birth was not observed is labelled "n/a".

In Table 3 upright position includes sitting, squatting, hunching, or standing (i.e. anything vertical). They were grouped together in this fashion because the females tended to change positions frequently (a few laid horizontal at some point but in all cases the majority of the time was spent upright). It is of extreme importance to note that in all of the cases observed, the mother laboured and delivered from an upright position. The fact that all of the nonhuman primate mothers favoured an upright posture may further support the earlier conclusion that humans are better adapted to give birth from a vertical stance.

V: ADVANTAGES OF OCCIPUT POSTERIOR DELIVERY

All three of the advantages Trevathan ascribes to nonhuman primates, because their neonates are born facing the mother, are supported in the literature.

In many of the documented cases examined, the mother did indeed manually assist herself during labour and delivery. Females were seen aiding themselves in numerous ways. Beck (1984) recorded a gorilla mother breaking her own water with her fingers. Many authors witnessed the female actually pulling the neonate from the birth canal for a variety of species, including the slender loris (Kadam and Swayamprabha 1980), the chimpanzee (Goodall and Athumani 1980), the patas monkey (Goswell and Gartlan 1965), the gorilla (Lotshaw 1971; Nadler 1974; Stewart 1977), the java macaque (Kemps and Timmermans 1982), and the toque macaque (Ratnayeke and Dittus 1989). One orangutan mother was also seen pulling the placenta out, as it was not naturally expelled (De Silva 1972).

In all of the cases where the neonate was born alive in the occiput posterior position, the infant is reported to have tried to grab hold of the mother.

It is well documented in the literature that nonhuman primate mothers usually lick the neonate clean. This practice has also been recorded in Tibetan human groups (Lindburg and Hazell 1972). This act is suggested by Trevathan as functioning not only to clean the infant and to remove any odoriferous remains that may attract predators, but to stimulate the neonate's breathing (Trevathan 1987). This 'artificial respiration' has been witnessed in orangutans (De Silva 1972). Lindburg and Hazell (1972) propose that humans do not commonly practice this post-parturition behaviour of licking the neonate, because of the highly manipulative and dexterous nature of the human hand which enables us to wash and clean the infant more effectively.

VI: PLACENTOPHAGY

The eating of the placenta by the primate mother has been classified by some researchers as a fourth stage of parturition (Adachi *et al.* 1982; Bowden *et al.* 1967). Others authors argue that although placental eating is unique to parturition it is a postpartum activity (Brandt and Mitchell 1971; Stewart 1977). Kemps and Timmermans describe a new java macaque mother greedily eating her afterbirth immediately after its explusion (1982:83). In Brandt and Mitchell's (1973:520) research, 85% of the rhesus monkey mothers ate their placenta.

Table 4 summarizes the incidence of placentophagy in the articles studied. If the birth and eating of the afterbirth was not witnessed, the column for "Placenta Eaten?" is labelled non applicable, even if the placenta was gone and presumed eaten. In all three of the cases where the placenta was not consumed, the birth was not observed, but the afterbirth was found uneaten.

In thirteen out of sixteen cases, the placenta was consumed. This is roughly equal to the 85% rate that was witnessed by Brandt and Mitchell (1973).

Many possible reasons for this practice of consuming the afterbirth have been proposed; however, the actual reason is still unclear. Placentophagy has been recorded in humans (Kay 1982; Lang 1972), but it does not occur at anywhere near the rate it does in nonhuman primates.

VII: THE RATE OF NIGHT BIRTHS

Normal, healthy, primate births are more likely to occur at night in diurnal species, perhaps to ensure that females are not left behind by the group. Human births have also been proven to occur at night at a statistically significant rate (Galdikas 1982; Jolly 1972, 1973; Trevathan 1987). It has been shown in the lowland gorilla that if delivery has not occurred by daylight, the contractions cease and recommence at sundown (Bowden *et al.* 1967).

This evidence does not support Trevathan's social assistance theory, despite the fact that the high incidence of night births may indeed occur so that the female remains with her social group. The fact that this trend is found in all diurnal primate species (Jolly 1972, 1973; Trevathan 1987), means that this is a primitive trait in primates. It is not then, uniquely selected for to aid in human parturition.

CONCLUSIONS

The cultural specificity of childbirth has been emphasized throughout this paper. Ethnographic evidence clearly demonstrates that childbirthing practices and beliefs are part of a cultural system in every society, including our own (Jordan 1983,1980). Although western parturition practices are usually believed to be based on medical or scientific facts, in reality this may not be true. Western, medical birthing methods must not be assumed to be the 'best', or 'most advanced' means of giving birth.

Many of the complications associated with human parturition have been demonstrated to be the result of the western custom of giving birth lying down. If women were in an upright posture during labour and delivery, perhaps childbirth would not appear to be such a uniquely difficult process.

It has been shown that the fossil record can not be used to draw conclusions about the midwifery practices of extinct species. Even if the physical sequence of events during parturition could be determined for a

hominid group, it could still not be known whether ancient women sought social assistance during childbirth.

The vast differences in complexity, duration and intensity of parturition believed to exist between humans and other primates has been strongly questioned. Parturition has been shown to be quite similar among all primates, not only in duration and position (excluding humans in the western world), but in social aspects as well. The tendency for females to seek the company of others during parturition has been shown in a number of different primate groups.

The ethnographic accounts of women giving birth in isolation discredit Trevathan's theory that midwifery developed to fill a unique need for humans to have social assistance during parturition, due to novel physical and physiological human traits. These examples of women labouring and delivering alone also discount alternative theories that midwifery developed to fill a universal human need for emotional support during childbirth. Human midwifery, may in fact, merely be a by-product of evolution, resulting from the increased ability of humans to use their upper limbs; thus enabling them to provide more direct assistance to the labouring female than is possible for other, nonhuman primates.

Trevathan's theory that the obligate midwife is unique to humans is not well supported. It is true that labour and delivery differ somewhat between humans and other primates in the mechanics, but many similarities exist as well. There is no paleoanthropological, ethnographic, historic, primatological, physical, or social evidence to back-up Trevathan's hypothesis that midwifery developed to fill unique human requirements. As well, her theory implies that since women who received help from others were 'selected' for, and therefore, that there is a genetic basis for this predisposition to seek assistance. A genetic basis for such a complex and variable behaviour is not only difficult to believe, but impossible to prove. Due to the fact that it is futile to try to determine if women seeking midwives enjoyed a 'selective advantage', there is no basis for Trevathan's hypothesis that this requirement led to the development of all human social groups.

I: APPLICABILITY OF THE RESEARCH

Due to the fact that "half a million women die per year from pregnancy and childbirth complications worldwide" (Armstrong 1990:50) it is obvious that more research is desperately needed in all associated fields of study. Further research should focus on the specific problems of childbirthing today and their interrelationships with cultural practices. Education about the actual mechanics and physiology of parturition through studies such

as this one will help to make childbirth a less traumatic experience for all women.

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Table 1 - The Eight Movements Typical of Fetus During Delivery

1	Engagement	oblique or transverse position as fetus enters birth canal
2	Descent	fetus passes pelvic inlet
3	Flexion	fetus brings chin to chest so the smallest cranial dimension is first
4	Internal Rotation	head lies sagittal in pelvic outlet and shoulders transverse in the pelvic inlet
5	Extension	head moves under the pubis, to be in front of the ischial tuberosity
6	Restitution	head returns to original position and shoulders remain transverse or oblique in inlet
7	External Rotation	shoulders move to sagittal position at outlet
8	Expulsion	anterior shoulder moves under the pubis followed by posterior shoulder

Table 2 - Summary of Nonhuman Primate Births

Author / Year	Species	Alone?
Kadam / Swayamprabha - 1980	Slender Loris	captive
Stewart - 1984	Gorilla	no
Goodall / Athumani - 1980	Chimpanzee	no
Beck - 1984	Gorilla	no
Heinrichs / Dillingham - 1970	Orangutan	captive
Fisher - 1972	Gorilla	captive
Galdikas - 1982	Orangutan	no
Nash - 1974	Baboon	yes
Sekulic - 1982	Howler Monkey	no
Adachi *et al.* - 1982	Rhesus Monkey	captive
Goswell / Gartlan - 1965	Patas Monkey	captive
Stewart - 1977	Gorilla	no
Kemps / Timmermans - 1982	Java Macaque	captive
Doyle *et al.* - 1967	Bushbaby	captive
Nadler - 1974	Gorilla	yes
Bowden *et al.* - 1967	Squirrel Monkey	captive
Ratnayeke / Dittus - 1989	Toque Macaque	no
Abegglen / Abegglen - 1976	Hamadryas Baboons	no
Hill - 1968	Pygmy Chimpanzee	captive
Skerten - 1972	Black Spider Monkey	captive
Frueh - 1968	Gorilla	captive
De Silva - 1972	Orangutan	captive
Kagawa / Kagawa - 1972	Gorilla	captive
Yadav - 1971	Stump-tailed Macaque	captive
Lang - 1961	Gorilla	captive
Lang - 1959	Gorilla	captive
Carmichael *et al.* - 1961	Gorilla	captive
Lotshaw - 1971	Gorilla	captive
Kirchshofer *et al* - 1968	Gorilla	captive

Table 3 - Positions of Nonhuman Primates During Parturition

Author / Year	Species	Position
Kadam / Swayamprabha - 1980	Slender Loris	upright
Stewart - 1984	Gorilla	upright
Goodall / Athumani - 1980	Chimpanzee	upright
Beck - 1984	Gorilla	upright
Heinrichs / Dillingham - 1970	Orangutan	n/a
Fisher - 1972	Gorilla	upright
Galdikas - 1982	Orangutan	upright
Nash - 1974	Baboon	n/a
Sekulic - 1982	Howler Monkey	upright
Adachi *et al.* - 1982	Rhesus Monkey	upright
Goswell / Gartlan - 1965	Patas Monkey	upright
Stewart - 1977	Gorilla	upright
Kemps / Timmermans - 1982	Java Macaque	upright
Doyle *et al.* - 1967	Bushbaby	upright
Nadler - 1974	Gorilla	upright
Bowden *et al.* - 1967	Squirrel Monkey	n/a
Ratnayeke / Dittus - 1989	Toque Macaque	upright
Abegglen / Abegglen - 1976	Hamadryas Baboons	upright
Hill - 1968	Pygmy Chimpanzee	n/a
Skerten - 1972	Black Spider Monkey	n/a
Frueh - 1968	Gorilla	n/a
De Silva - 1972	Orangutan	upright
Kagawa / Kagawa - 1972	Gorilla	n/a
Yadav - 1971	Stump-tailed Macaque	n/a
Lang - 1961	Gorilla	upright
Lang - 1959	Gorilla	n/a
Carmichael *et al.* - 1961	Gorilla	n/a
Lotshaw - 1971	Gorilla	upright
Kirchshofer *et al.* - 1968	Gorilla	n/a

Table 4 - Placentophagy

Author / Year	Species	Placenta
Kadam / Swayamprabha - 1980	Slender Loris	yes
Stewart - 1984	Gorilla	yes
Goodall / Athumani - 1980	Chimpanzee	yes
Beck - 1984	Gorilla	yes
Heinrichs / Dillingham - 1970	Orangutan	n/a
Fisher - 1972	Gorilla	yes
Galdikas - 1982	Orangutan	yes
Nash - 1974	Baboon	n/a
Sekulic - 1982	Howler Monkey	yes
Adachi *et al.* - 1982	Rhesus Monkey	n/a
Goswell / Gartlan - 1965	Patas Monkey	n/a
Stewart - 1977	Gorilla	n/a
Kemps / Timmermans - 1982	Java Macaque	yes
Doyle *et al.* - 1967	Bushbaby	n/a
Nadler - 1974	Gorilla	n/a
Bowden *et al.* - 1967	Squirrel Monkey	yes
Ratnayeke / Dittus - 1989	Toque Macaque	yes
Abegglen / Abegglen - 1976	Hamadryas Baboons	no
Hill - 1968	Pygmy Chimpanzee	n/a
Skerten - 1972	Black Spider Monkey	n/a
Frueh - 1968	Gorilla	n/a
De Silva - 1972	Orangutan	yes
Kagawa / Kagawa - 1972	Gorilla	n/a
Yadav - 1971	Stump-tailed Macaque	n/a
Lang - 1961	Gorilla	n/a
Lang - 1959	Gorilla	no
Carmichael *et al.* - 1961	Gorilla	no
Lotshaw - 1971	Gorilla	yes
Kirchshofer *et al.* - 1968	Gorilla	yes

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