

Chapter Six ~ψ~ Fertility and Function

If the whole neuroendocrine model that we outlined in chapter four has any validity, we would expect clues that offer support to emerge elsewhere on our palette of human systems. We have already implied that a human system released from the left hemisphere's control could exhibit quite fundamental physiological differences. Digestion, immune function and even structural changes could result from a change in hemispheric controller via, of course, the chemical messengers that are released by that controller. In this chapter we investigate the effect that powerful steroid inhibition would have had on our biology, particularly within those systems in which hormones play a key role.

HUMAN FERTILITY ~ψ~

When we think of hormones we automatically think of the reproductive system. If we compare human reproduction to that in any other animal it becomes immediately apparent that we are stuck with a very inefficient system. 'Just as well' you might say; our planet is crowded enough, but this is to miss the biological point. We have compensated for the inefficiency by, among other things, being mentally fixated with sex but we will return to this obsession later.

One essential property of evolution is that it results in exceptionally efficient systems. It is a harsh process. Traits that do not work well are selected out of populations. Living systems that do not fit their environment fail to thrive and, without change, become extinct. Most animals have very efficient reproductive systems that ensure conception with a minimum number of matings but in humans the success rate is a lowly 5%. In other mammals it is about 95%. This doesn't necessarily prove anything, but it does beg the question of how, in evolutionary terms, such an inefficient system could have come about.

The whole process of ovulating, menstruating and rebuilding the uterus every month also appears extraordinarily wasteful - particularly as it occurs even when there has been no sexual activity at all. Although there are some parallels with other animals in which there are periods of oestrous, the human system is unique in its wastefulness of resources. In many of those animals that do not have breeding seasons but can breed, like humans, at any time of the year, ovulation is linked in a direct way to the act of copulation. Thus we are left wondering how could the female cycle as we know it today possibly have evolved? What is the evolutionary advantage of monthly ovulation and heavy external bleeding? Something in all this is highly unsatisfactory.

Another anomaly of the human reproductive system is menopause. The loss of fertility long before death is virtually unique to humans. We can see from hormone replacement therapy that simply replacing a few powerful hormones, even in their synthetic form, can restore the reproductive system to something approaching a pre-menopausal level of function. Could this be a clue to what has happened in humans?

Orgasm is another extraordinary feature of the human sexual system. What is it for and why did it evolve? Why are humans the only animals to be blessed with such a powerful response? In the male, orgasm is coupled with the release of sperm. Could this, in our pre-fall state, have been paralleled in the female? Is possible that female orgasm was releasing mechanism for the ovum? If so what could have happened to upset this potentially highly efficient system? We know of course that there is a correlation between male orgasm, the function of the testes and the release of sperm. Foetal development of males (see Chapter 4) shows us that males are not much more than hormonal variants of females. Genetically males and females are virtually identical. Is it not worth at least asking then, whether female orgasm should have a parallel function to male orgasm? If the female orgasm evolved as a mechanism for releasing the egg, what would this imply? Why doesn't it work now? In males, there is a psychological and neurological response (the feeling) connected with a mechanical response (muscle spasm). Perhaps in the female something has occurred to break the link between the orgasmic responses that we do see and the release of the egg.

In the previous chapters, we have proposed a variation on the standard model of human evolution which stresses the importance of the neuroendocrine system. The degeneration of neural/consciousness function, that we suggest humanity has suffered, would have in turn affected many aspects of psychology and physiology. The reproductive system is perhaps the most hormonally sensitive of all our physiological functions. Even the smallest shift in hormone activity can induce significant changes in structure and function. Thus, if we return to our hypothetical fruit-eating population of proto-*Homo sapiens*, we can ask what would be the effect on the reproductive system of a diet rich in steroid-suppressing chemicals? What would have happened to fertility when the proposed powerful internal pineal loop kicked in? Then, having adapted to such an altered hormonal regime, what would have been the result when a rapid loss of steroid inhibition exposed the product of a unique evolutionary variation to a far higher level of steroid activity. It is impossible to significantly alter hormone activity within the body without having an effect. Some change in our reproductive system would be inevitable.

To clarify these issues, we can divide our development into three evolutionary periods: The ancestral period, the period of steroid inhibition with rapid brain expansion, and the subsequent period in which this steroid inhibition was progressively lost.

THE ANCESTRAL PERIOD ~ψ~

It is reasonable to assume that early hominids had a reproductive system, which was similar to most other primates, with a repeating oestrous cycle that provided a window of sexual receptivity and ovulation. Mating (at least successful mating) would have pretty much been confined to this receptive time. It may be delightful (or not) to speculate that our habits may have been like that of our closest relatives, the bonobos, that copulate pretty much all the time. But as their promiscuous habits are in part a response to psychological pressures such as fear and security, and cultural reasons of establishing alliances and hierarchies, such comparisons do not shed much light on the biochemistry of the matter. It is interesting to note however that bonobo fertility is somewhat similar to that of humans. They both display so called concealed ovulation (males do not seem to know when ovulation is occurring) and bonobos have a light

external bleed that is equated with menstruation. It is also interesting that, despite such a preponderance of sexual activity, bonobo populations have relatively remained low. Bonobos are very intelligent. They are, for instance, better at using tools than chimps. Yet, like chimps, they haven't had the population explosion that has occurred in humans. Of course such a population growth is dependent on many interlocking factors, but the biology of fertility systems may be one that has been largely ignored to date. It is possible that the biochemistry from a diet rich in fruit may be having an effect on the fertility systems of bonobos and, to a slightly lesser degree, chimps too.

The hominids in the forest would have eaten a largely fruit/leaf/flower/shoot diet. Some groups or species may have specialised more on one aspect of the diet than another but in all groups, fruit would have been a much-favoured element. As we have seen, this diet contains chemicals that mimic animal oestrogen, and it is acknowledged that these phytosterols/hormone mimics can have a significant effect. They do this by adding to the pool of oestrogen but as they are less potent than their human counterparts they dilute and weaken overall oestrogen activity. They can further reduce oestrogen activity by blocking oestrogen receptor sites and even mopping up oestrogen molecules themselves. Phytosterols therefore will suppress oestrogen levels in the body, but this suppression, in a roundabout way, very much affects fertility. Recent investigations into the use of soya-based concentrates, such as baby foods, have revealed that the amount of oestrogen-like substances that they contain can equate in strength to a couple of birth control pills a day. It is thought that the sustained high intake of soy isoflavones (a type of phytoestrogen) amongst Japanese women may account for their menstrual cycles being on average 32 days in length – about three days longer than those of 'western women'. Another study found that sheep became infertile when they were allowed to graze on a monoculture of clover – it too was rich in phytosterols. If our ancestors had a daily intake of two to three kilos of fruit and shoots, rich in these compounds, it surely would have had a significant effect on the reproductive system (and indeed on the functioning of the mind and body as a whole). The bioflavonoids and related phytosterols found in a primarily fruit/vegetarian diet would be powerful enough to modify our internal hormonal balance. It is from this background level of chemical nourishment that we think our evolutionary development took a great leap forward.

THE PERIOD OF STEROID INHIBITION ~ψ~

We have seen that the period of rapid evolution, that mankind went through, was fuelled by external and subsequently (and crucially) internal chemicals which markedly suppressed steroid levels and their activity within the body. This would have caused many changes in structure and function, but potentially none would be greater than the change to a reproductive system that we know is so hormonally sensitive. Thus a reproductive system which had slowly evolved over millions of years was, in evolutionary terms, 'suddenly' subject to increasingly powerful steroid inhibition. What could have emerged to accommodate this new regime for it is certain that, if this scenario is correct, it would have to have changed? It is possible that with powerful external and internal suppression of steroids, fertility could have over time become very low but immunity and health very high. This may have resulted in a small population made up of individuals, who were long-lived and healthy. Our reproductive system would have to

have adapted to the high level of steroid inhibition to compensate for low fertility. A unique mechanism could have emerged to cope with this unique scenario.

It is evident that our present day reproductive cycle can be altered by diet alone. In baboons too (a monkey that does display menstruation) it has been found that females stop their menstruation when they are fed a vegetable only diet. We know of course that the human female cycle can be changed by overt methods like contraceptive pills, but, as we have already seen, even plant hormones, such as Soya bioflavonoids, can alter the 'monthly' cycle. Leslie and Susannah Kenton in 'Raw Energy' have commented upon this effect. They state that:

'Women on an all-raw or high raw diet often report that menstrual problems such as bloating and pre-menstrual tension and fatigue greatly improve after two or three months. For some of them the improvement is so dramatic that they are not aware of their periods until they arrive. Heavy periods become lighter – a period that ordinarily lasts six or seven days can be reduced to as few as one or two. In some women, particularly those who did not eat meat, dairy products or large quantities of nuts, periods even cease altogether.'

The absence of periods in women, who follow diets rich in fruit and vegetables, has been linked to increased levels of carotene. A team of gynaecologists at Rutgers University in New Jersey investigated a group of women who exhibited both carotenemia (a change in skin tone due to large amount of carotene absorbed from carrots and other vegetables) and amenorrhoea (a cessation of periods). They wanted to ascertain whether there was a link between the two conditions. All the women were in excellent health and were not adversely affected by these 'complaints'. The team found that when carotene was excluded from the diet of these women, their menstrual period returned. When they reverted back to their original diet they became amenorrhoeic again.

It is not clear from this study whether fertility was affected. It is possible that ovulation continued without the need for menstruation. There are cases in which women have become pregnant even though they have ceased to have periods. Taking the pill all the time (not breaking it for a week a month) also stops periods but occasionally pregnancies can still occur in women following this regime. Menstruation is not fertility, though they are of course linked in our present state. Eating a diet rich in fruit and vegetables can stop menstruation and ovulation can be stopped too. However there may be a finely balanced point in which ovulation may still occur without the need for menstruation. Whether this is just an occasional aberration or something more is in need of clarification.

British gynaecologist C.A.B. Clemetson has investigated another aspect of this ability of chemicals within fruit and vegetables to change the nature of the female cycle. He became interested in the subject when a young Italian woman told him that she reduced her excessive menstrual bleeding by sucking lemons – apparently the local folk cure for the problem. As a result of his research, Clemetson has shown that citrus bioflavonoid levels in the blood can indeed reduce menorrhagia (heavy periods). Doses of citrus bioflavonoids, combined with vitamin C, given for three or four months significantly reduced excessive bleeding in most of the women who participated in the trial. And many of these maintained their lighter periods when they acted on his

recommendation to eat three oranges a day. If you are tempted to try this, remember to eat plenty of the white pith, for it is the pith that is richest in bioflavonoids.

Several of the bioflavonoids, found in fruit and vegetables, mimic some of the effects of the female sex hormone, oestrogen. One of these effects is oestrogen's ability to strengthen the fragile capillaries that occur in the walls of the uterus. It seems that at the times of the female cycle when oestrogen levels are low, as they are during menstruation, the bioflavonoids compensate and take over the task of strengthening the capillary walls that would otherwise break down. This helps to reduce menstrual flow. It is the cyclical fall in oestrogen that brings on the breakdown of the walls of the uterus and the subsequent bleeding. If oestrogen levels do not fluctuate (but remain either high or low) menstruation does not occur.

We can see then how bioflavonoids can ameliorate the effects of the cyclical rise and fall of oestrogen levels and that a diet high in carotene can actually stop the process altogether. It is not a great leap therefore to suggest that at some time in our evolutionary past, the steroid inhibiting compounds taken in from a fruit-rich diet could have stabilised oestrogen at a low activity level, resulting in a cessation of monthly periods. By building this missing link into the model of human biochemistry, a different picture emerges that seems to provide some explanation for the many anomalies that are apparent in the human reproductive system.

Indeed the whole fertility cycle as we know it today may be the result of a period of powerful steroid inhibition followed by the breakdown of this effect. Menstruation may thus be a symptom of hormone imbalance. However, the fertility cycle is extremely complicated. Rafts of different hormones, including estradiol, nor-adrenalin, luteinising hormone and gonadotropins, together with associated neurochemicals interact to regulate each other's activity. Altering any one element would have many knock-on effects; and the scenario we have proposed would have altered many of these elements. Because of the complexity of the system it is difficult to track the full ramifications of the different interactions and feedback loops. We can speculate however on the most likely outcomes of this model.

Basically we believe that the combination of the dietary hormones and increasing melatonin acted like a contraceptive on the archaic oestrus cycle. The hormonal cues and triggers that regulated the oestrus cycle were increasingly dampened to the point where ovulation became less frequent and the cycle itself began to stall. This scenario would have produced strong selection pressures to find an effective solution. If reproduction were becoming more difficult, any changes that would have enhanced fertility would have had more chance of being passed to the next generation and so become incorporated into the human make-up. A chemical/hormonal trigger produced during copulation sufficient to tip the balance from effective contraception to ovulation would have been such a change that could have enhanced fertility.

If the flood of steroid inhibitors held the female reproductive cycle in a state of suspension, something would have been needed to induce ovulation. And, for maximum efficiency, ovulation would need to be induced at the time of mating. A physical mechanism, linked to a psychological/neurochemical one, may then have been the key to releasing the ovum in response to sexual stimulation. Orgasm, therefore could have been a central part of this mechanism, acting in the female in the way that it still works in the male.

As the model we have proposed suggests ever-increasing levels of melatonin, any solution to this fertility problem would need to keep pace. An increasingly powerful neuroendocrine response linked with copulation to trigger the now stalled oestrus cycle may have been the result. Specifically this would mean sufficiently powerful and sustained orgasmic states would have been needed to induce ovulation.

The human fertility cycle is usually portrayed as being regulated by a small number of key hormones and some neural feedback mechanisms: Cyclical increases in levels of steroids induce a surge of luteinising hormone that in turn triggers ovulation. Recent research has found that the picture is more complicated still with the brain itself playing a bigger role particularly in regard to the release of luteinising hormone.

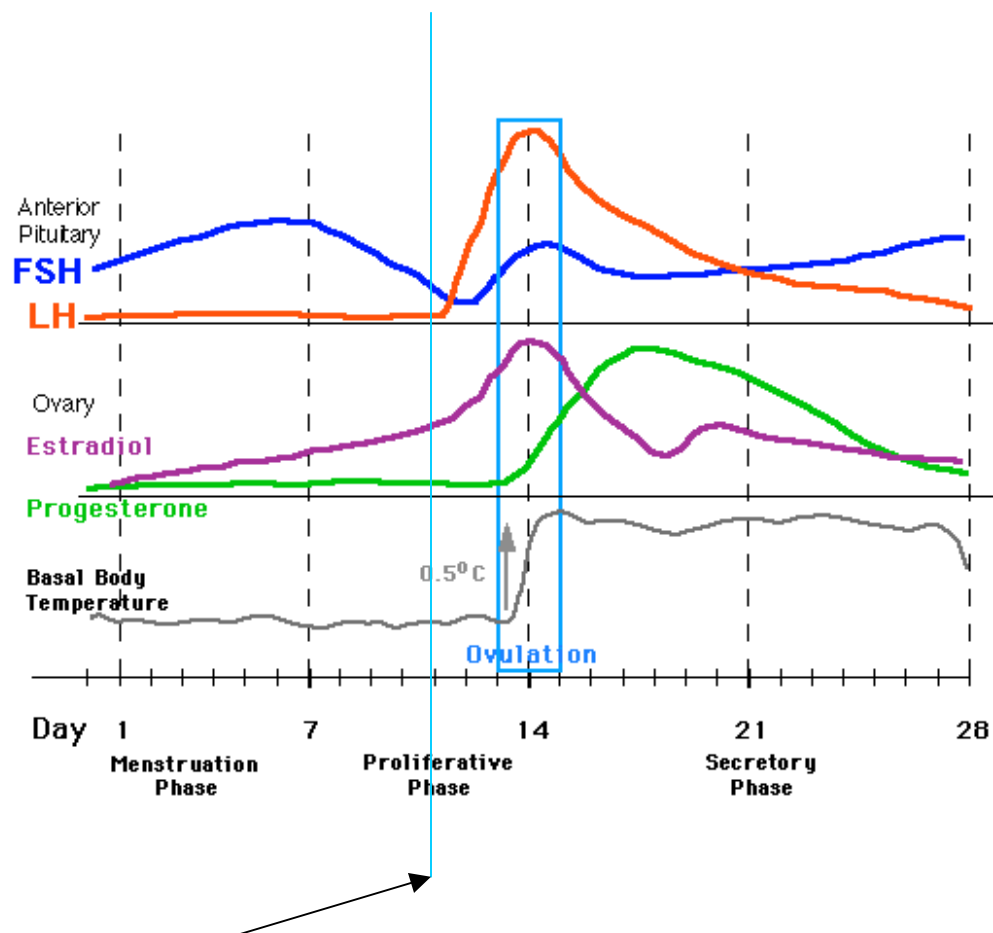


Fig 6a: This diagram illustrates the typical hormone patterns in the human menstrual cycle. The line at day 11 represents the hormonal balance that would have been in stasis in our proposed 'stalled cycle' until orgasm induced ovulation.

This neural regulation of luteinising hormone may emerge to be greatly significant. The part of the brain that helps to regulate fertility hormones, including luteinising hormone (LH), is the hypothalamus. The hypothalamus is also involved in excitement and has

direct connections to areas of the brain concerned with pleasure. Thus pathways seem to exist that link orgasm (excitement and pleasure) to neuroendocrine changes that induce ovulation. In the past then it is certainly tenable that orgasm may have stimulated ovulation but, for this to occur, orgasm may have needed to be intense and sustained.

In most circumstances today, the hormonal effects induced by orgasm are not powerful enough to induce ovulation, but some hormonal changes do occur. Orgasm is known to elevate LH and oxytocin. Oxytocin in turn increases steroid levels that can further stimulate LH production.

There are physical affects of orgasm that are consistent with this model too. When a woman achieves orgasm just after the man, the cervix dips, scooping into the pool of sperm deposited near it. Female orgasmic contractions can also enhance the passage of spermatozoa towards the fallopian tube, thus increasing the likelihood of conception. Significantly, this is under hormonal control. Oxytocin is the hormone that stimulates smooth muscle tissue in the wall of the uterus and is associated with promoting labour and delivery (oxy = quick and tokus = childbirth). But circulating concentrations of oxytocin also rise in both males and females during sexual arousal and peak at orgasm. There is evidence that it stimulates, in males, smooth muscle contractions in the walls of the sperm duct and prostate gland, and in females, contractions in the uterus and vagina that promote sperm transport towards the uterine tubes. There is also evidence that the fluids released during female orgasm can also help sperm reach their goal. Female orgasm is then, at some level, still linked to mechanical function, but should it go one stage further and release the ovum too?

It would have been an absolute necessity for a powerful and efficient system of reproduction to be established to overcome the effects of increasing steroid inhibition. The increased inhibition may have directly impinged upon the ovulation mechanism. In addition, if there was low libido, a reducing window of sexual receptivity and possibly not a lot of sexual interest, the reward for sexual activity had to be significant, and the efficiency of the system had to be maximised, to ensure the continuance of the species. The primary role of orgasm in the female could therefore have been the induction of ovulation, linked to maximising the efficiency of the process. Orgasm may have had a very important secondary role too, for in a being that possibly had a suppressed libido and perhaps a very benign natural state of consciousness, a reward may have been necessary to encourage sufficient sexual activity for procreation. And orgasm may have become such an intense reward because the basic state of the mind of man 'before the fall' could have been of a different order than it is today. We may have been blissed-out on wild figs, bananas and beingness!

If this scenario has any validity, we would expect some relics of the system to still be identifiable. The link between oxytocin and orgasm goes some way towards this, but a recent study on cardiovascular and endocrine alteration after orgasm in women provides more direct clues. It was found that sexual arousal and orgasm produced a distinct pattern of neuroendocrine changes, primarily inducing a long lasting elevation in plasma prolactin concentrations. Luteinising hormone and testosterone concentrations were also increased, but FSH, progesterone and other hormones were unaffected. This is a very interesting set of results. Although there is still much to discover about the many roles of individual hormones, it appears that prolactin (its main roles are the stimulation of mammary gland development and the stimulation of milk production) makes interstitial

cells of the testes more sensitive to luteinising hormone. It is possible or even probable that it plays a parallel role in females, sensitising elements of the ovaries to luteinising hormone. Thus we can see that female orgasm, even today, stimulates the release of chemical messengers that at least go some way towards promoting ovulation. If in the past orgasm was more intense and of greater duration, the effect on the release of fertility hormones may have been stronger by many degrees.

As human orgasm is regarded with a certain amount of bafflement, there has been some research into its possible function. Investigations into orgasm as an inductive mechanism for additional ovulation have been so far inconclusive. However research to date does not take account of the potential changes a much more intense and sustained orgasm would bring - the kind of orgasm in females that may have been normal at one time. In circumstances in which the oestrus cycle is stalled, the ovum held close to release and the uterus is in a partially receptive state, a relatively small change in hormone levels could be sufficient to bring about ovulation.

If there were a link between orgasm and ovulation, this would of course invariably lead to conception. Thus to follow this line of enquiry, we could look for evidence that links orgasm to conception. We are suggesting that the fertility system within women today has suffered some level of breakdown, therefore we would not expect to find an obvious correlation, and have come across very few studies in this area. But there is some anecdotal information available. There are cases in which it appears that particularly intense and/or prolonged orgasm has resulted in conception at 'safe' periods in the cycle. It has also been observed that prolonged intercourse and/or orgasmic states can induce slight bleeding. This may not occur immediately but it does within a day or so. It would seem therefore that the bleeding is not a result of tissue damage but would be similar to the slight bleeding that can occur with ovulation. 'Susan X', a client of hypnotherapist and author David Pedersen, relates how she had the most colossal orgasm she had ever experienced with her extra-marital lover. This was followed by almost continuous intercourse for the next three hours, throughout which she maintained a huge sexual plateau that produced multiple orgasmic peaks. The following day she started what she thought was her period but it later emerged that she actually became pregnant as a result of this conjugation.

It is widely known though rarely openly discussed, that for many women their ability to orgasm at all, let alone maintain a highly intense state for extended periods seems to be a difficult area. In contrast, the rapidity of the male orgasm has been an issue for as long as anyone can remember! However there are exceptions. Some female orgasms are much more intense than others. These tend to come about after a sustained level of sexual activity. And sometimes they can be accompanied by a female ejaculate. There isn't very much known about female ejaculation. It seems only to occur rarely and when it does the orgasmic state is extremely intense. There may be a parallel here to orgasm in males in which Cowper's glands and the prostate release fluid to increase the efficiency of the conjugative process. In vaginal ejaculation, it seems that, fluid is released from the Skenes' glands, which surround the urethra and are similar to the male prostate. It has also been noted that high levels of testosterone and oestrogen are found in the bloodstream during these particularly intense orgasms. As we have already noted elevated levels of these hormones stimulate LH production. This strengthens the possible link between ovulation and intense orgasm. More research on this unusual function is

necessary to answer all the questions posed by the mere existence of these states, but we are left wondering how could these high orgasmic states, and their accompanying physiological alterations, have evolved if they were not at one time the norm? They couldn't have been hanging around latent just waiting for sexual researchers to discover them!

It is in this area that this theory intersects with our consciousness model, for 'high orgasm', as we may term it, could be primarily a right hemisphere function. The very intense states may no longer be available to the damaged left hemisphere, and its dominance may be one reason why orgasm is suppressed in some women and difficult or even impossible to achieve. The switching of balance between the right and left hemispheres may also explain why sexual activity and particularly orgasm can take us away from our limited ego state into blissful transpersonal states of being. Sometime however, in males particularly, there can be a negative reaction to this - a post orgasm irritation. This may be a response to the brief loss of ego self and the vulnerability this bring to the left hemisphere self that always needs to be in control. We have already highlighted recent research that suggests that the brain may play a direct part in regulating fertility hormones. The 'pre-fall' brain may have had an even larger role. Orgasmic response and subsequent hormonal release may have been more significant. It is likely that the dominance today of the left hemisphere may in some way be inhibiting these effects.

Most of the structural and functional changes within this model would have occurred on the female side but what about the males? The corresponding aspects of the male side of this story would again arise from a background of a different state of beingness. With steroid inhibition, testosterone levels or activity would be at a lower general level than they are today. As testosterone is a primary factor in libido (for both sexes), we can speculate that at this critical time in our evolution, male libido would also be low and it would have been more difficult to reach orgasm. (Almost the reverse of the situation today.) Thus a sustained amount of sexual activity would have been needed in both males and females to achieve both orgasm and a release of sperm and ova. If a male climaxed without a corresponding female orgasm, the ovum would not be released and conception would not occur. Male and female sexuality thus had to match for successful reproduction, and the reward was an intense feeling of bliss which was greater than the already benign state of consciousness that we enjoyed at this time. This scenario provides a realistic explanation for the presence of orgasm in humans. Something unique must have occurred somewhere along our line of descent for the strange anomaly of pleasurable orgasm to become such a strong feature of the human bio-system.

Diet certainly affects libido. In one touching account, 'alternative' writer Robert Wilson reminisces about a natural-food crusader he once knew. This fellow regarded most food fanatics as hopelessly corrupt compromisers; only *he* had the correct 'natural' diet, which consisted entirely of fruit, nuts and *uncooked* vegetables. When asked, "what was the greatest single benefit he got out of that regime," he replied at once that it solved all his sex problems. He expanded on this beguiling statement: "I hardly have any sex drive anymore," he said, unabashed, even a bit proud. "I don't *need* women the way I used to. I'm free. No problems in *that* area *at all*." Many followers of raw food and fruitarian diets have noticed a similar decline in libido.

Could all this have a bearing on the very small numbers of humans or proto-humans that studies suggest we are all descended from? As we will see later, human sexuality may have been very different when we had a very different sense of self. There was nothing really to stop us exploiting our environment at any time in the past but numbers remained low. We were clever and highly adaptable but we didn't appear to have the overwhelming desire to populate the whole globe. There wasn't the inherent drive (in males particularly) to continually chase the shallow orgasm that seems to be present now. We seem addicted to sex but could we really be addicted to the feeling we gain from being momentarily free from our ego-based, fear-ridden, left hemisphere sense of self. Is the sexual drive, which has reached obsessive levels in our society today, a result of a striving to regain something that in our deepest being we know that we have lost? Is there a parallel here with our deep desire to 'know ourselves', to 'reach nirvana' or to become 'one with God'? At some fundamental level, we know there is something more to the sexual experience but, because we don't know where to look, the craving becomes attached to the whole raft of sexual expression from glossy car adverts to the darkest depravity. All this is without doubt coming from a human mind system that has become disconnected from the true needs of the body and from a much more balanced, intuitive and complete side of us. This obsession, which is everywhere in western society (sex sells everything), compensates for the very inefficient reproductive mechanism we are left with today. In fact it has over compensated by a very large factor! We are out of balance in many truly fundamental ways. 6000,000,000 sex-obsessed humans to date and still copulating!

THE FALL ~ψ~

According to our hypothesis, our direct ancestors moved or were forced out of the forest some 200,000 years ago. This eviction from 'the Garden of Eden' necessitated a change of diet which initiated an increase in steroid levels. This would have caused a corresponding decrease in the production of melatonin and pinoline. These two factors would have profoundly affected many areas of the body's biochemistry but particularly the reproductive mechanism. Melatonin has been used, in trials at least, as the basic ingredient of a contraceptive pill for it has been found to stall (what is regarded as) the normal female cycle. This stalled cycle would, we propose, have been the normality before the 'fall'. Higher melatonin levels resulting from a highly boosted pineal pump would have produced a system that remained in stasis between copulation-induced ovulation/pregnancy events.

A female (and male) in the African Forest some 200,000 years ago would have conceivably reached puberty at a later age than females do today. (Perhaps an age of 18 would have been the norm compared to the 9 to 13 or whatever age it has been reduced to now). In the Ecuadorian Mountain village communities, mentioned in chapter two, girls were found to be 'immature for their age'. They started to menstruate at the age of 13 at the earliest and some didn't start until they were 18. The boys too didn't show signs of puberty until they reached the age of 15 or so. Though the overall framework for puberty is under genetic control it would, as it is today, have been fine-tuned by individual

variation in hormonal levels. But the extent of the age range shows there is a great deal of plasticity within the system, and this variation is dependent on hormonal regime.

The medical and scientific community largely assumes that the increasingly early puberty, that appears to be linked to our modern western diet, has no consequences but is this laissez-faire attitude justified? A shorter juvenile period means a shorter window for neural development, and this reduction may even produce a mild retardation. Eunuchs apparently have a greater longevity than testosterone-pumping males so it seems that lower steroid levels do have some positive effects. Perhaps a late puberty would allow the neural and neuroendocrine systems to develop a little more which would increase both the life span and the health of the individual.

According to this part of our hypothesis, when our 'pre-fall' ancestors reached puberty the cycle that we are familiar with today would not have occurred. Within the maturing female, the uterine system would partially build in response to her maturing hormonal regime and from then on it would be set to go. With a diet high in natural oestrogen-like mimics and the pineal pumping high levels of melatonin and betacarbolines, her uterus would have been held in partial readiness for conception with no regular ovulation and no monthly uterine breakdown. The system would therefore reach a stasis, similar to the regime under the control of contraceptive hormones, with a partially mature ovum and a partially built uterus. Ovulation would have been held in check by the very different hormone regime but it would have been held close to release all the time (Similar to the period around day 11 of a typical cycle now - see figures 6a and 6b).

All it would have taken would have been powerful sexual stimulation for the whole thing to kick in. Sustained and intense orgasmic states would have been enough to temporarily alter the delicate hormonal balance by inducing higher levels of LH, steroids and others hormones that would in turn allow the egg to be released at the time of mating. This represents a highly efficient fertility/reproduction system without any needless waste.

With the loss of the steroid inhibition the brakes came off. The system started to behave strangely. It was no longer held waiting in readiness. Before the fall, as puberty set in, internal hormone production merely had to raise the background oestrogen levels to a point where differentiation leading to sexual maturity took place. Then, as levels receded, the sustained external oestrogen mimics kept the uterus stable and intact. But nowadays the female hormones do their work without the background level of steroid inhibition to act as a buffer. Once the 'build a sexually mature human' phase is completed, the newly mature system is exposed to a much higher background steroid level than it was designed for.

As the fertility cycle is today, rising steroid levels trigger a surge of LH that in turn induces ovulation without sexual activity. Ovulation without fertilisation triggers a number of feedback mechanisms similar to those that used to regulate the archaic oestrus. A new cycle is created that still allows incidental fertilisation but is greatly inefficient and damaging.

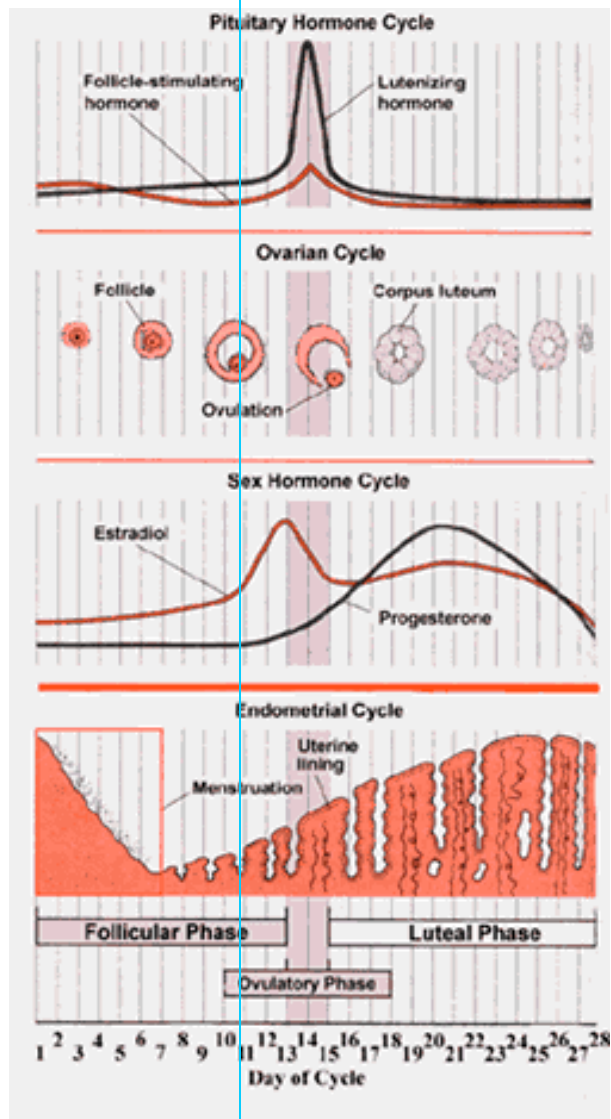


Fig 6b: This diagram also illustrates the typical menstrual cycle. In the normal cycle it is apparent that the uterus lining is only partially thickened before the hormonal changes that occur with ovulation. Even this degree of thickening may be due to excess steroid activity. Again a line has been added to give some idea of how an oestrus cycle in stasis may have looked: A rise in key hormones brought about by intense and sustained orgasm being enough to trigger ovulation that in turn bring further hormonal changes.

The high levels of steroids promote the uterus lining to grow rapidly and possibly to excess. But within a few days, this same hormonal imbalance also induces ovulation. The hormonal effect of ovulation in itself further stimulates the lining to grow. However without fertilisation further hormonal changes including a reduction in steroids eventually lead to its breakdown. Steroid levels begin to rise again and the cycle continues. In contrast, in our 'pre-fall' days, ovulation itself would have induced the hormonal changes that would have brought the lining of the uterus to a state in which it was ready for implantation. And this would only occur after a successful mating.

The female cycle today varies in length from 15 to about 32 days. This is a massive variation. The belief that that the cycle follows the moon, or at least that it should do, doesn't appear to fit the observations. The moon does indeed have some affect on all of us – males included. More babies are born at the time of the full moon and our sleep patterns often change around this time too. The moon may even have a tidal affect on us (we are after all 70% water!) but the menstrual cycle does not appear to follow the lunar one at all closely. Women do not all bleed at the same time. There may be *some* lunar affect for the average length of the cycle *is* close to the lunar one. But it seems that the length of the menstrual cycle depends more on the time it takes for the individual women to get through the hormonal process, which in turn is dependant on her individual level of steroids. This is why external factors, such as diet, can modify the system and why activities such as meditation that boost melatonin production in theory can also. A study on fertility in women meditators would be a worthy one. Couple this with the effects of a raw food diet and it would be worth a doctorate! It would be extremely interesting to see the results of a serious study that really investigated in depth the links between bioflavinoids, raw food, melatonin and female fertility. Would a low steroid regime restore some stability to a system that appears to have become one of runaway self-destruction?

It may be something of a hit and miss affair but, in sexually active women who are fertile, ovulation will sometimes coincide with intercourse and a pregnancy may result. The steroid-induced ovulation, via additional hormonal release, precipitates further hormonal change that will either support conception and development or start the cycle again. In some situations, for instance early menopause or early sexual maturity, the hormonal cycle does not bring about ovulation: insufficient steroid levels do not trigger the LH release of the ovum. This may hint at what can happen if the current steroid cycle is moderated.

Although we have remained able to reproduce, the continuing background of high steroid levels will still, as we have discussed earlier, have a detrimental effect on the developing foetus in the uterus, particularly on the neo-cortex of the left hemisphere. It is also possible that stress in pregnant mothers will add to these negative affects via the increased levels of cortico-steroids that circulate round her and her developing child's body. A damaged, fear-based left hemisphere self may in itself be responsible for increased levels of cortico-steroids; and this may be the basis for another negative feedback loop that potentially could increase with every succeeding generation. The fear of childbirth that is particularly prevalent in the west could conceivably also feed in to this unhelpful loop.

This may have some relevance to the way the human birth process is approached, particularly in hospital deliveries. In modern western culture, intervention is the norm.

The hormone oxytocin is administered almost as a matter of course. Oxytocin is a feel-good hormone that stimulates smooth muscle tissue in the walls of the uterus, promoting labour and delivery. (It is also involved in the release of breast milk and as we have already seen, concentrations of the hormone rise during sexual arousal and orgasm.) The human body is quite capable of producing sufficient levels of its own oxytocin, yet a boost is deemed necessary within hospital environments which, due to their clinical and imposing nature (not to mention their association with illness), is bound to increase levels of apprehension. If, however, a relaxed state is induced by music, meditation, immersion in water, aromatherapy oils etc., the birth process appears to work more smoothly. It is probable that such relaxed states enhance the release of oxytocin. A comparative study of oxytocin levels between women who experience hospital deliveries and perhaps water births would be very interesting. We could justifiably speculate that the relaxed mother is in more of a right hemisphere mode of function. Her birthing process may be easier than a mother who is more locked into her left dominant-hemisphere, fear-based self. Again the implication is that a right hemisphere mode of operation is more efficient than the left mode.

Before the 'fall', the rebuilding of a receptive uterus would have occurred once or perhaps a few times at puberty and thereafter only following a pregnancy and on the rare occasions when a copulation/ovulation failed to result in conception. There would have been long windows between rebuilds for, after a pregnancy, it is likely that the inhibitory effect of breast-feeding (on the fertility system) would have been stronger under a low steroid regime. [The hormonal changes brought about by regular breast-feeding even now will inhibit conception 99% of the time in the first year and about 97% in the second. This further illustrates the degree which changes to the hormone regime can affect fertility. It is an extremely hormone-sensitive system.] For a child with a delayed puberty/longer juvenile period, five or more years of breast-feeding may have been normal. Chimps on average have seven years between conceptions and so similar period in humans may be 'more natural' than the relatively short periods we are familiar with today. Thus with relatively few conceptions during a females life and consequently few rebuilds, the system would be well able to cope. It cannot however cope with a rebuild every month coupled with the hormonal 'roller-coaster'. The consequence is menopause – a mammalian anomaly virtually unique to humans. The system collapses in on itself. It cannot do any more. The high steroid regime wins in the end and women become a bit more like men.

HAIRY WOMEN AND BALD MEN ~ψ~

Whilst we are looking for symptoms that might suggest we are at the wrong end of the re-emergence of a high steroid low melatonin regime, it may be fun to turn our attention to the perennial problem of hair. For this discussion and indeed this whole chapter, we need to keep in mind that the steroid regime which is regarded as more or less normal, is in fact, within the context of this model, abnormally high.

Male pattern baldness is accepted as a natural consequence of ageing. Baldness however is not deemed acceptable to most middle aged men inspecting their receding hairlines in the mirror every morning. A full head of shiny hair is a symbol of youth and

attractiveness and we want to hang on to it for as long as possible. Hair is power! Throughout history long hair on warriors has been a symbol of strength, and even the words Caesar, Kaiser and Tsar mean hairy in their original form. As a consequence of these feelings about hair, a whole host of treatments have been devised to counter its loss. Perhaps one of the earliest documented cures goes back to around 400 BC. The Greek physician Hippocrates recommended rubbing the scalp with an ointment made of opium mixed with wine, acacia juice and the oil of olives and rose. For severe cases, a paste of cumin, pigeon droppings, beetroot, nettles and horseradish was prescribed instead. Many modern approaches are similarly bizarre and most have only minimal effect but that there are now hormonally based remedies that do partially reverse the process is interesting.

The hormone most often fingered for this crime against hair is the androgen dihydrotestosterone (DHT). This can cause hair follicles, of both men and women, to become dormant. Excess DHT can be combated with anti-androgens. The very fact that we can respond to such treatment again shows how much plasticity there is within the human system, especially where hormones are concerned. That balding can be treated with something that reduces the activity of the testosterone group of hormones is a further indication that we are suffering from too high a level of these hormones. Balding therefore, in itself, can be seen as an outward expression of our dysfunctional system. As an aside, it is also worth noting, in the light of the previous section, that one of the effects of taking hormones for the 'hair today, gone tomorrow' problem can be a loss of (standard ideas of) libido.

One could also ask what the evolutionary advances of early hair loss are – particularly for those savannah dwelling and evolving humans? How could this trait of balding have possibly come about? That it is an anomaly, thrown up by an archaic change in steroid levels, makes more sense than any existing theories. Perhaps those who still think that man evolved on the savannah would like to explain the advantages that hair loss would bring to a male on the sun-drenched plains of Africa!

With increasing age, many women also experience head hair thinning along with hair thickening on the upper lip and sometimes other areas of the face. As, in general, we value a glamorous idea of beauty more highly than just about anything else, this is seen as a problem. Female pattern baldness like male baldness involves genetics, vitamin/mineral uptake and stress but the key component of the problem is again hormonal balance. As well as excess of (DHT), balanced thyroid hormone production is also critical; hypothyroidism results in coarse lifeless hair which easily falls out, while hyperthyroidism causes soft, thinning hair. In women at menopause, the ratio of androgens to oestrogen change and this is often the trigger that leads to increases in facial hair and head hair loss. These problems, in both men and women, are almost certainly compounded by the reduction of melatonin production that occurs as we age. We have seen that steroids, or at least their activity, can be inhibited by bioflavonoids and melatonin, thus it is possible that diet as well as activities that boost melatonin production (like meditation) could ameliorate these negative effects. Doesn't all this really suggest that we have a body system today that is abnormal? With a much lower level of steroid hormones none of these strange things would happen.

Stress can also cause hair problems. Cortico steroids (the stress hormones that are closely related to testosterone) are enough on their own to activate facial hair follicles in women. It has also been noted that, in stressed middle-aged women with a facial hair

problem, dealing with the stress alone can have an effect. For example, changing the consciousness system, from that of stress to one blissed out on love, can actually stop the unwanted hair growth!

Some psychologists think that dominance in females (and probably men as well) is a trait closely associated with high levels of testosterone. And the research so far does support the contention that female students, managers and professionals secrete above average levels. Can this be related to hairiness? Hirsutism is a more extreme 'hairy condition' in which, in response to abnormally high levels of androgens, there is excessive growth of hair on the face or body. Usually it is only regarded as a problem for women – hairy males are more or less socially acceptable. And in women it can be accompanied by other changes such as balding, deepening of the voice, increased muscle mass, loss of breast tissue and acne. These masculine traits are typical of our (cruel) characterisation of 'dominant' woman. New research from the University of Auckland has found that even the way women view themselves is directly related to the degree of testosterone they secrete. Women who actively thought that they had dominant traits actually secreted higher levels of testosterone. So like the above example of the woman in love, it seems that what we do with our consciousness can affect our biochemistry, and this in turn can feed back into our physical structure as well as our behaviour. What a complicated system! No wonder we have such a problem with relationships, wars etc!

The link between acne and abnormally high levels of testosterone has a bearing on another anomaly of our human system that can also be explained by too high levels of these pesky steroids. Sebaceous glands in humans seem to have gone crazy! These glands are an appendage of hair follicles, and they produce an oily substance called sebum that helps to keep the fur of mammals sleek and waterproof. In a naked ape, it would be reasonable to expect these glands to have become largely vestigial, but the opposite seems to have happened. The sebaceous glands of African apes are found scattered all over their bodies, but they are small and few in number. In man, they not only are more numerous but also much bigger, especially on the face and scalp. Sebum does not seem to have any usefulness to us in our hairless state – it is not needed to keep the skin moist or supple. In fact, if anything, it causes problems. Sebum provides a breeding ground for dandruff and dermatitis, and is associated with pimples, black heads and inflamed nodules.

The sebaceous glands do not begin to operate until puberty. This is why adolescents have such a sudden problem with acne and related skin blemishes. Sebaceous gland activity is a response to sex hormones. It is likely that it is an anomalous response. We don't need sebum except perhaps to add gloss to our head hair, and, as children, we don't produce much of the stuff at all. Thus hugely active sebaceous glands have not evolved in man for a purpose. Their ebullient activity is rather another indication of our anomalous levels of steroid hormones. Under a much lower steroid regime, the sebaceous glands would not develop in the same excessive way.

SEROTONIN, TESTOSTERONE, DEPRESSION AND MURDER ~Ψ~

Studies of individuals who display psychopathic behaviour and have been convicted of the darkest of crimes show that they suffer from low levels of serotonin and high levels of testosterone. This is in effect, according to our theory, the extreme end of what all of humanity has been exposed to. The combination of low serotonin/high testosterone appears to be linked to violence, the willingness to kill, uninhibited aggression, and a detached unemotional mental state with a total absence of compassion. Such individuals have a greater sense of disconnection from others and a greater sense of isolation. We can surmise that within these individuals there is even less of the biochemistry to fuel the sense of connection to all life, and left hemisphere dominance is more complete.

In instances when chemical or physical castration has been carried out on the worst offenders (which in cases of sex attacks and serial murders are virtually always men) the incidence of re-offending has been reduced by a massive factor of twenty. Reducing testosterone levels thus stops the criminal behaviour almost entirely. This is a staggering finding. Just by changing one or two core biochemical pathways, behaviour can be changed. There may be a massive web of chemical interaction that make up our behaviour patterns but this work shows that testosterone has a disproportionate effect; an imbalance can lead to violent results. If, as we believe, we are all suffering from too high levels of testosterone this connection between testosterone and violence has enormous implications for society.

Recent studies suggest that anti-social conduct may be linked to diet too. Increasing the levels of vitamins, minerals and fatty acids in the diets of young, imprisoned offenders reduced the number of disciplinary offences committed by over a quarter. Significant infringements of the rules, including violence, fell by 37% when supplements were given to a trial group. Though this research has come as a surprise to many people, it doesn't surprise us. It is what we would expect if our thesis were correct. Bernard Gesch, who conducted the work whilst he was at Surrey University, has correctly pointed out that nutrients are crucial ingredients in the biological processes that produce brain transmitters like serotonin and dopamine, which affect mood. As a junk food diet free from fresh fruit and vegetables is becoming more prevalent, this evidence suggests we are sowing the seeds for a much more disruptive and violent society.

Furthermore, research on monkeys reared in isolation has found that in comparison to those benefiting from a normal interactive upbringing, they were less socialised and grew into more aggressive adults. These monkeys had less serotonin activity. Linked to this, there is some evidence that suggests that touch, particularly a mother's touch, is very important to babies and young children. It can affect life long levels of serotonin. Perhaps a society that isolates its children into cots and crèches is storing up more and more problems. We should all ask ourselves 'is this normal primate behaviour'? A lack of touch in early childhood may make depression in later life more likely. It has been stated that depression will soon be the second most widespread medical condition. We also know that the prescription and consumption of Prozac is increasing all the time. Does this not indicate something about our internal levels of these chemicals? Does it not suggest that something has not only gone seriously wrong but that it is getting worse? There is a direct connection between the levels of neurotransmitters

like serotonin and steroid hormones like testosterone; more steroids lead to less neurotransmitter activity.

MELATONIN, THE PINEAL AND SEX ~ψ~

In medical cases in which damage, such as a tumour, blocks the function of the pineal gland in children, puberty is rapidly initiated. The high levels of melatonin found in children are therefore implicated in the suppression of their sexual development. When levels drop, puberty begins, and in girls, ovulation commences. It is known that melatonin regulates many hormones including those that regulate the menstrual cycle. Fluctuations in melatonin levels stimulate the pituitary gland to release, among others, luteinising hormone, oestrogen, follicle stimulating hormone (which regulates the production of sperm in men and stimulates the maturation of ovaries in women), prolactin and oxytocin. Thus we can see that melatonin and the pineal play a crucial role within the human fertility system. Anything that alters the balance of pineal function will also affect fertility.

All this has raised the possibility of using melatonin as an oral contraceptive. Endocrinologist Michael Cohen, formally of Dijkzigt University Hospital in Rotterdam has discovered that high doses of melatonin, when combined with the female hormone progesterone, can block ovulation. Because of questions concerning the safety of the oestrogen-based contraceptive pill (oestrogen has been shown to increase the risk of certain forms of cancer), Dr Cohen set out to develop a new oestrogen-free pill. His research resulted in a contraceptive pill that contained a dose of 75mg of melatonin with a small amount of synthetic progesterone. During trials, carried out in Holland, over two thousand women took this pill for over three years. It proved every bit as reliable as the standard pill and what was perhaps just as remarkable was that the women reported no unpleasant side effects – no headaches or bloating, both of which can occur with the oestrogen pill. In fact the women in the trial reported a generally heightened sense of well being.

This is all very interesting from the point of view of our hypothesis. It is significant and reassuring to see that even when melatonin is taken in very high doses, it appeared completely safe. A trial that raises melatonin levels to such a high degree, and results in, not only no negative side effects but also positive ones, certainly doesn't contradict the idea that at some point in our past our pineal glands may have pumped much more melatonin. Additionally Michael Cohen found that the high levels of melatonin did not, as one might expect, increase drowsiness. Melatonin taken in low doses acts as a sleep regulator but at the 75mg a day level the trial subjects experienced no sleepiness. It seems that, like other hormones, melatonin works differently at high doses than it does at low doses.

Hormones are extremely complicated, perplexing and powerful chemicals! There is much more waiting to be discovered about their roles and particularly how they interact with one another. We have seen that as a result of steroid suppression it is possible that libido can be reduced, and it is probable that what can be described as 'the rush to lust' can be calmed under such a regime. There is evidence that more melatonin can make sex a more pleasurable experience too. Melatonin heightens the effect of our internal

endorphins. These are substances that alleviate stress and help to produce sensations of pleasure and relaxed well being. It has even been reported that melatonin, via its stimulation of oxytocin and prolactin, may encourage the physical contact and intimacy that leads to sensual activity. When these hormones were experimentally injected into mice, a dramatic increase in the mouse equivalent of cuddling and hugging took place. In addition, when melatonin was added to the evening drinking water of old mice, it was found that not only did they show signs of rejuvenation and increased longevity but also that they engaged in sexual activity again.

Melatonin may help preserve the health of the prostate gland too. This male gland produces the fluid that carries sperm. Nowadays the prostate glands of some fifty- percent of men over the age of fifty become enlarged and this can interfere with both urination and sexual function. That so many men today are afflicted by this ailment suggests that something about our biological system is indeed out of balance. Proscar, one of the drugs used to treat this condition, works by inhibiting the enzyme 5-alpha-reductase. This enzyme breaks down male hormone into a more potent form that can stimulate the growth of prostate cells. Melatonin also inhibits this enzyme. In fact, when the pineal gland is experimentally removed from mice (resulting in a decline of melatonin) their prostate glands become enlarged but when additional melatonin is given, the gland returns to its normal size.

If in our 'natural state' we had a much more active pineal that pumped more melatonin, we can assume that many aspects of our biology and particularly our sexuality/fertility would have been different. A lower level of steroid hormone activity and more melatonin may have produced a much more efficient, healthy and a less wasteful reproductive system. This regime may have lead to more ecstatic, joyful, sensual and prolonged lovemaking with less of an emphasis on, or a least less of a rush towards, orgasm. We can only wonder what spin-offs this would have had on our consciousness.

SEX AND DRUGS AND TANTRIC TABOOS ~ψ~

There is a wealth of evidence that humans can still access prolonged transpersonal states of bliss through sexual union. All the major religions, with perhaps the exception of the most patriarchal and fear inhibited strands of Christianity, have had their sexual mystics and have honoured them. Various Tantric traditions from India to China have used sexual union, in conjunction with awareness of subtle energies within the body and higher states of consciousness, to attain oneness with the 'divine'. The ancient Greeks and Romans also had their cults that combined ritualised sex with magic and often wine too. Sex, drugs and rock and roll has a long history. From Bacchanalian revels to the rituals of present day underground culture, there are many anecdotal accounts of heightened sexual experiences in combination with particularly drug use. (Alcohol, despite perhaps enhancing relaxation and inhibiting fear, in large amounts definitely doesn't enhance sexual experience. Its negative properties are well known and all too commonly experienced.) In Robert Anton Wilson's book 'Sex and Drugs there is the following:

'Pot lends itself to every form of sensory enrichment and has been associated with both sex and religion for a long time. In India, Hindus of the Shivite sect are often seen stumbling out of their temples, stoned into the middle of next week, muttering the marijuana mantra, Bom-Bom-Mahadev, which translates as 'Boom! Boom! Great Big God' – a sensation that even irreligious pot smokers will vaguely recognise.'

And again:

'With pot, sexual intercourse becomes more pleasurable and more relaxed. It makes you a better lover. You feel closer to your partner than you would otherwise. I can feel myself actually fusing with the other person – it is difficult to know even anatomically what part of myself is me and what part is the women.'

And again:

'And the acid made my consciousness go into the very top eighth of an inch of the head of my penis. That's all I was – just that fragment of flesh entirely surrounded by cunt and pulsating with joy. Then – boom! – I wasn't even that. I was nowhere and yet I was everywhere. Now, that's exactly what the Hindus call Samadhi – union with the All.'

Cannabis and tantric practices, we deduce, both help access to the right hemisphere self. Of course within the bliss of orgasm the small ego sense of the left hemisphere is also temporarily suspended. Unfortunately, as noted by no lesser commentator than William Shakespeare, 'normal' orgasm is often nothing more than a 'momentary trick'. D. H. Lawrence called it a 'sneeze in the loins' – orgasm has descended to a very fleeting and limited experience. By extending orgasm via practices that often include delay or abstention of ejaculation, profound oceanic states can, not only be reached, but also dwelt in for lengthy periods. Masters of Tantric yoga are reputed to be able to continue the act of love for seven or eight hours. Aleister Crowley, who dabbled in most aspects of Eastern yoga and Western occultism at some stage in his eventful life, was convinced that sexual yoga was the quickest and easiest way for the average westerner to expand their consciousness. Dr Richard Alpert, who transformed himself from a clinical psychologist working on LSD to the guru Baba Ram Dass, wrote:

'Tim (Leary) is absolutely right about LSD enhancing sex. Before taking LSD, I never stayed in a state of sexual ecstasy for hours on end, but I have done this under LSD. It heightens all of your senses and it means that you're living the sexual experience totally. Each caress or kiss is timeless.'

Despite Ram Dass' interesting experiences he concluded that drugs in themselves were not the answer. Such states may be attained more safely and more sustainably using 'spiritual' practices that heighten our consciousness. And these states *are* accessible. Some drugs do have the effect of enhancing the senses but how are they doing this? Some of the effect may be purely chemical hallucination but part may be due to an opening of the gates to the flood of sensory information that normally 'we' filter out. (Our damaged left hemisphere cannot access all this information due to its inability to cope with

anything but a simple flow of incoming data.) This opening can lead to intense sensations of pleasure that course through the entire body. Sensitivity and sensuality is heightened, all touch and interaction becomes a shared oceanic experience, and the desire or drive for orgasm seems to dissipate. Sexual interaction can last much longer with extended periods of complete merger with one's partner. There is often a loss of the sense of time and a general feeling of oneness and euphoria in which, paradoxically, the 'I' that started the process disappears. The body becomes the whole universe and the whole universe the body. Something else is accessed in these experiences – something larger or wider than oneself and something that is not restricted by space and time. If the restrictions of space and time stem from the processing capacity of our dominant left hemisphere, where is this other sense coming from?

Perhaps we all know somewhere in the depths of our unconscious that sex offers more than it routinely provides in this day and age of instant gratification. This is the reason why we, particularly in western societies, are so obsessed with sex, and why some get distracted by deviant practices. We know there is a deeper secret hidden somewhere within our sexuality but most of us are looking for it in the wrong place. The result is a high level of psychological frustration that is externalised to produce a society swamped with sexual images. An increased amount of testosterone coursing through our bloodstream does not help matters. This has not only boosted our libido to perhaps uncomfortable heights but also (as we have seen in hyenas) testosterone can markedly affect levels of aggressive behaviour. Aggression linked to sexual behaviour is very unpleasant. We do not need to really comment here on the problems to society that this obnoxious combination brings beyond noting that it too is consistent with our hypothesis of a dysfunctional part of the brain.

We must also remember that the brain runs on 'drugs'; drugs, despite the connotations of this label, are after all only chemicals. If the brain under our present steroid regime is chronically short of some chemicals, perhaps serotonin and other key neurotransmitters, it is possible that the long history of using DMT mimics in religious/shamanic ritual has been a crude attempt to redress the balance. This cultural use may not have merely been a quest for experiential perceptual effects but for a restoration of health, and perhaps represented an attempt to regain lost states of consciousness brought about by a failing pineal gland. The plants used in these rituals, those that make up South American ayahuasca and Middle Eastern soma, have basically the same biochemical properties. This convergence provides a pointer to the idea that a shortage of DMT may be one missing piece of the consciousness jigsaw.

DMT, THE PINEAL AND SPIRIT ~ψ~

Di-methyl-tryptamine (DMT), despite its complex sounding name, is a structurally simple chemical, derived from tryptophan, an amino acid present in our food. DMT occurs in plants and animals and is part of the normal make up of living things. It has been found in human brain tissue and in our blood and urine, so there is no doubt that we internally produce what is one of the most powerful hallucinogens of all. DMT is particularly abundant in plants of South America, and it is there that, within the cultural traditions of particularly the rainforest tribes, humans have explored its remarkable

psychedelic/consciousness expanding properties. In large doses DMT blows open the doors of our normal perceptions to allow access to worlds beyond our imagination. Fantastic visions, out of body travel, near-death experiences, predictions of the future, contact with the dead and 'alien' presences, are all part of the DMT realm. Some of these experiences sometimes occur in people spontaneously, without resort to any extraneous chemicals. There are even cases in which individuals are totally convinced they have been taken to another world by aliens. If drug-induced and naturally occurring mental conditions appear to overlap, it certainly hints at some natural function for this endogenous brain chemical.

If one chemical can do all this, many questions arise about the nature of our normal consciousness. In the early 1950s, the discovery of the related tryptamines, LSD and serotonin, raised such questions, and rocked the foundations of the comfortable domain of psychiatry. In 1955, Hungarian chemist and psychiatrist, Stephen Szára, having been frustrated by unsuccessful attempts to procure LSD and mescaline for a research project, synthesised some DMT in his Budapest Laboratory. He then tried it out himself, at first, by eating it. This had no effect; it was later discovered that there is a mechanism in the gut that breaks down DMT. (The secret of the South American tribal brews, like ayahuasca, is that they include chemicals that inhibit this mechanism.) Szára then injected DMT and its effects became very evident indeed. He wrote:

'The hallucinations consisted of moving, brilliantly coloured oriental motifs, and later I saw wonderful scenes altering very rapidly. The faces of people seemed to be masked. My emotional state was elevated sometimes up to euphoria.'

Szára then co-opted thirty volunteers who were all given the full 'psychedelic' dose. Their accounts are extremely interesting, particularly those that speak of spiritual experience. Here are some fragments: 'The whole room is filled with spirits.' ... 'I feel exactly as if I were flying' ... 'Everything has a spiritual tinge but is so real.' ... 'In front of me are two, quiet sunlit Gods...I think they are welcoming me into this new world.' ... 'I am finally at home.'

With the explosion of interest in hallucinogenic drugs within the youth culture in the 1960s and the subsequent authoritarian backlash, legitimate research into LSD and DMT was halted for a generation. This was a shame for some of the research was very promising. For example, consciousness researcher Willis Harman found that LSD had a very positive effect on creativity. Now however a few studies are being undertaken again, the most notable being Rick Strassman's investigation into, what he has called, 'the spirit molecule'. Such research is deemed important, not only for the light it shines on the nature of the human consciousness system, but also for the potential of these chemicals to help resolve deep psychological problems.

After a lengthy battle with the relevant state departments to gain the go ahead, and further difficulties in procuring the highest grade of DMT, Strassman finally administered the drug to a carefully chosen group of volunteers. Most of these found the high dose of DMT exciting, euphoric and extraordinary pleasurable. Sometimes this elation related to the unfolding visions themselves and sometimes it arose from the revelatory insights that were gained during the sessions. For some, however, the experience was extremely frightening and this could have been, in part at least, to the almost complete loss of control the participants felt.

Intriguingly, some of those that managed to go beyond this loss of control barrier, noted an ‘outside’ intelligence or force directing their minds, and a few of these believed they had contact with beings. Several volunteers experienced ‘abduction by aliens’ and interactions with them. Despite the bizarre nature of these scenarios, they felt very real. One volunteer reported that ‘it felt more real than real’ Though the high doses of the hallucinogen were without doubt creating all sorts of perceptual peculiarities, these incidents are reminiscent of the split consciousness effects within schizophrenics. Were the alien voices and visions arising from the part of the mind beyond the ego mind? They had to come from somewhere! The unlikely alternative is that they really were coming from an external source and the DMT was facilitating some sort of access. This is an idea that Strassman seriously considers. His findings suggested that DMT provides regular, repeated and reliable access to ‘other’ realities and these could be thought of as something like TV channels. He then goes on to ask whether these other channels of existence are always present, ‘transmitting’ all the time, but under normal circumstances are not perceptible. He speculates that our natural (chemical) balance keeps us tuned to ‘Channel Normal’ but, when subjected to a flood of DMT, our minds open to these other planes.

Does DMT remove a filter that then allows access to different dimensions? It would take a lot to convince us that there really were aliens out (or even in) there! But it is possible that there could there be a link here to a filter imposed by the left hemisphere self. We have seen in the last chapter how the brain, under certain conditions (as demonstrated by autistic savants) can take in vastly more detail than it does when working ‘normally’. If DMT was allowing the brain to open to a flood of sensory data as well as distorting that data, it could explain some of the reported results. Much more research needs to be done in this area, but it may be significant that the ‘aliens’ tended to communicate using a language of universal visual symbols rather than sounds and words; a means of communication more in tune with the right-hemisphere self.

Whenever possible Strassman tried to recruit volunteers who had already had some experience of hallucinogens. It appeared that those that were more familiar with the effects of mind-altering drugs were less prone to fear and were less likely to project such things as alien encounters into their experience. Could it be that the left hemisphere, which we know tries its best to make up stories to fit experiences it cannot cope with, was grasping at ideas of aliens to try to get a handle on the flood of unusual sensations? Certainly this would be the simplest explanation for these bizarre encounters.

One further effect that was experienced by many of the DMT volunteers was a loss of normal time perception. Most believed their entire session had only taken a few minutes. Many felt that, at the highest point of their DMT experience, they entered a timeless zone, but within that zone an enormous amount happened. We can also note here that, according to our speculation, the right hemisphere self functions within the timeless present, whereas the left functions within a constructed time scale of past events and anticipated futures. All our worries and fears occur within these projected places, thus by being forced to step outside these ephemeral time zones, insight can be gained into the nature of our personal problems. Strassman found that the euphoria brought on by DMT helped volunteers to look at their lives and conflicts.

While the most bizarre and extreme effects came from high doses of DMT, Strassman experimented with smaller ones too. The lowest category of dose was

experienced as pleasant, and almost all the volunteers said they felt like smiling or laughing after receiving it. If we can accept that our usual mental state of something bordering on worry and fear is an imbalance and not 'normal', it is possible that this imbalance is due to a chronic shortage of this natural brain chemical. Strassman thought there was something 'peerless' about DMT despite its overt chemical and hallucinogenic similarities to LSD and the other tryptamine hallucinogens. One of its differences though is the speed of its action – the hallucinogenic effect is felt within a few seconds of it being intravenously administered, and the entire 'trip' only lasts some ten to fifteen minutes. This points to something that is unique about DMT. It appears that our brains have some mechanism that rapidly 'consumes' this chemical.

DMT is the simplest of the tryptamine psychedelics and the smallest. Its molecular size is only slightly greater than glucose. The brain, being a highly sensitive organ, possesses a nearly impenetrable shield, the blood-brain barrier, which prevents unwelcome chemicals leaving the blood and entering brain tissue. Even complex carbohydrates and fats that other tissues use for energy are kept out. The brain uses only the purest form of fuel – glucose. However a few essential molecules, like the amino acids needed for the construction of brain proteins, are actively transported across the brain-blood barrier. Twenty-five years ago, Japanese scientists made the startling discovery that DMT is one of the select number of chemicals that are actively taken into the brain. Once in the body or brain, certain enzymes break it down within seconds. These enzymes are none other than the monoamine oxidases (MAO) that we have come across before. The very enzymes that are inhibited by the bioflavonoids found in fruit! Strassman points out that the brain is acting almost as if DMT is a 'brain food' – glucose is treated in a similar way. Both are part of a rapid turnover system. All this suggests that DMT is a highly significant part of our functional make-up but what is it actually doing?

One of Strassman's speculative conclusions is that a certain level of DMT is needed by the brain to keep it on the perceptual straight and narrow. That is it acts as a 'reality thermostat' keeping us within a narrow band of experience. Too much of the chemical and all manner of unusual visions and feelings appear on our 'mind screens'. Too little and our view of the world dims and flattens. These latter effects are just what normal volunteers feel when they are experimentally given antipsychotic drugs. It is possible that these 'medicines' cause such depressive symptoms by blocking the production or action of endogenously produced DMT. If this were so, who is to say the levels of DMT that we produce today are correct for optimal human performance. If our brains have suffered some degeneration over the last however many thousand years perhaps our DMT levels are a little low.

We must also reconsider the work of Serafetinides, who, you may remember from chapter one, discovered that LSD did not work in the left hemisphere. If LSD, for whatever reason, has no perceptual effect on the left hemisphere, we must ask whether the structurally very similar DMT cannot work its magic here too. Further research into this area would be useful. Although it seems simplistic, it is just possible that, if the left hemisphere is damaged and cannot respond to its optimal quota of DMT, our perception of our self is distorted. As all our individual and collective problems stem from our selfish, ego-based, disconnected sense of self, all this has profound implications.

Though the crucial diagnostic experiment has yet to be done, all the evidence points to the pineal gland as the site of DMT production. Most spontaneous experiences

of alien abductions occur in the early hours of the morning – just at the time the pineal is at its most active. The pineal contains the highest concentrations of serotonin in the body. This chemical is the raw material for melatonin and in all probability DMT too. The pineal has the ability to turn serotonin into tryptamine and it also contains high levels of methyltransferases – the enzymes that attach methyl groups to other molecules. These enzymes only have to do their job twice to construct di-methyl-tryptamine (DMT). As we have noted in earlier chapters, the pineal also makes beta-carbolines, and it is these compounds that inhibit the breakdown of serotonin and DMT too by blocking the action of the body's MAO. Thus the pineal gland may not only produce DMT but also the chemicals that prolong its activity.

But how could DMT production be activated? We know that melatonin synthesis in the pineal is 'turned on' by the neurotransmitters, noradrenaline and adrenaline, which are released by nerve cells that almost touch the gland. We also know that the adrenal glands produce these two neurotransmitters and release them into the bloodstream in response to stress. Thus stressful conditions could potentially upset pineal activity, particularly as the pineal exists outside the brain-blood barrier and so should be responsive to blood borne chemicals. However the pineal has its own security system that protects it from such interference. This mechanism is very efficient: It makes it difficult for melatonin to be produced during the day but even so the system can be overridden. We have already discussed how meditation and cannabis use can initiate melatonin production and boost levels in the blood to a marked degree. Could parallel mechanisms initiate DMT production?

For enough DMT to be produced to precipitate extraordinary visions the security system around the pineal would presumably have to be overcome as well as the activity of the methyltransferases boosted, and MAOs inhibited. Some research suggests that, if the body/mind is subject to enough stress, it is possible to breach the pineal gland's defence shield. If this stress then precipitated excessive DMT production, it could help explain the bizarre perceptions like alien abductions. In studies of people who claim to have had such encounters, it has been found that they usually occur at times of personal crisis, loss or trauma. There is some indirect evidence to suggest that, in psychotic individuals, the pineal gland's defences do not function normally: Stress can worsen hallucinations and delusions, and the intensity of such symptoms is related to levels of DMT. It has also been found that DMT levels rise in animals exposed to stress.

To add a further twist to this fascinating story, it is possible that the odd experiences and weird visions are actually distorted interpretations arising from the limited perceptual abilities of the left hemisphere. If the dominant hemisphere is presented with an experience beyond its computational abilities, it attempts to make sense of it may result in a distorted fear-based picture.

To tie this all together then, we can tentatively conclude that DMT is produced in the pineal, used in the brain and that overproduction, brought on by stress, can lead to strange experiences. DMT affects how we feel. Low additional doses have been found to bring on feelings of laughter and happiness and a shortage of the chemical has been associated with depressed states. DMT may be acting in the brain therefore as some sort of regulator of consciousness. It is also possible that the chemical does not work in the left hemisphere as it does in the right. If this were indeed the case, particularly as our left hemisphere sense of self is dominant, the implications would be enormous.

Before leaving this discussion on DMT we should touch on the subject of ‘spirit’. The pineal has, in many cultures, been associated with spiritual experience. It has been called the ‘third eye’ and the ‘seat of the soul’. It is associated with internal light and spiritual illumination. Such spiritual experiences that include visions of angels, hearing heavenly sounds, a sense of timelessness and near-death experiences occur within all religious traditions. They are also characteristic of a fully psychedelic DMT ‘trip’. So if stress can cause the pineal to produce DMT can its opposite, meditation, do likewise? Rick Strassman believes it can.

Meditation (as well as prayer, chanting, visualisations) can effect the pineal and brain activity by shifting the balance between left and right hemispheres. Studies show that in meditation, brain wave patterns are slower and better organised than those produced during our usual states of awareness. These brain wave patterns can lead to a deep state of bliss that we can feel throughout the body. Within the brain, Strassman speculates, these patterns may induce a resonance that would effect all our structures. It is just possible that such a resonance within the pineal could weaken the barriers to DMT formation resulting in a surge of the chemical that could become stronger as the meditation became deeper. The highly blissful states that can be attained by meditation are certainly similar in nature to the euphoric ones experienced by Strassman’s volunteers. Furthermore, in the light of two of our previous sections on fertility and sex, we can also make the connection between these highly euphoric states and those attained during the deepest, most loving orgasms. We suspect that DMT is playing its part here too.

THE IMMUNE SYSTEM ~ψ~

The thymus gland is the most central and essential organ of the body’s immune system. It lies in the upper chest and in infants and children it is relatively large, commonly extending from the base of the neck to the area of the upper heart. The thymus reaches its maximum size and weight (about 40 grams) just before puberty. After this significant life change, it gradually diminishes in size and by the age of 50 it will usually weigh less than 12 grams. It is believed that the decreased size and secretory abilities of the thymus may make the elderly more susceptible to disease.

The thymus produces several hormones that are important to the development and maintenance of our immunological defences. These thymic hormones (thymosins) promote the development and maturation of the white blood cells (lymphocytes) which are the ‘sharp end’ of our immune response. Approximately 80% of circulating lymphocytes are ‘T-cells’ and these are dependent on the thymus gland. There are many different types of T-cells and all are important in maintaining the health of the body. Some attack foreign cells or cells infected with viruses. Some stimulate regional inflammation and local defences in injured tissue. Some are ‘helper’ T-cells that stimulate the activation and function of both T-cells and B-cells (those that are derived from bone marrow, and some are ‘suppressor’ T-cells that together with the helper cells, regulate and fine tune immune response.

The thymus then is of crucial importance but strangely at puberty, in response to increasing levels of steroid hormones, it starts to shrink. As it does, its internal structure

becomes so 'disorganised' that many researchers believed that it ceased to function altogether. But Richard Boyd and Jayne Sutherland of Monash Medical School in Melbourne have recently found that, in mice at least, the thymus does continue to produce T cells at about one tenth of the rate it does in a young animal. Furthermore, when they physically castrated mice they found that the thymus regained its youthful appearance within four weeks and that the number of T cells it produced increased to near pre-pubertal levels. In a related study, Richard Koup and colleagues at the University of Texas Southwestern Medical Center in Dallas measured the levels of a genetic by-product of the release of T-cells by the human thymus. Koup's team found that, as in mice, the gland continues to function after puberty at a similarly reduced level. Koup also has evidence that the increase in T cell numbers in HIV patients receiving aggressive treatment with combinations of AIDS drugs is caused, at least in part, by the release of T-cells by the thymus. This strongly suggests that boosting the gland's function may help combat aids and possibly any other invasive disease. If this research is combined with the Australian work, an extremely powerful therapeutic tool can be identified. If drugs can be given that suppress the production of sex steroids, the thymus may regain some of its size and function. If it starts to pump out more T-cells, the immune system will function much more efficiently and viruses that were thought to be too much for the human immune system may be dealt with not only efficiently but also in a much less toxic way.

This could have far-reaching medical consequences but, if our hypothesis is correct, we were once and still could be living with much lower levels of steroid hormones flooding our bodies. With lower levels of steroids or at least a suppression of the activity of those steroids, a thymus that functioned fully, perhaps even into old age, may have been the norm. This would have had attendant effects on health and longevity. The unique circumstances within our evolution that we have outlined in chapter four would not have only produced a big brain but also a much more efficient immune system. Could we today then be running a system with only a fraction of its potential? As it is now, our immune system builds but then is suppressed at puberty. It is still pretty amazing (as all human systems are) but possibly it is only a shadow of its former self.

If we all have the potential of a much more powerful immune system, it is conceivable that, from time to time under unusual circumstances, it may be stimulated to come on stream. Such an alternative pathway could explain aspects of 'spiritual' healing, healing with hallucinogens, spontaneous remissions and even old tales of a golden age when everyone was reputedly long lived and bounding with health. There is something in all this that is worthy of further investigation. The overall picture is simple and wouldn't be difficult to conclusively prove. We already know that if steroid hormones are suppressed the thymus reactivates and can act powerfully. That this occurs is regarded as an anomaly but if in fact the anomalous feature is our overactive steroid hormones, the whole way we look at our immune system radically shifts. The levels of steroid hormones that we regard as normal today significantly suppress our immune function. If the levels of these steroids or at least their activity were experimentally reduced or inhibited by increased levels of melatonin, beta-carbolines and nutritional chemicals, our immune system should be enhanced. This, if our theory were correct, would have been the immunological scenario 'before the fall'. As these steroids are the same ones that Geschwind and others suggest have a deleterious effect on particularly the left cerebral

cortex of the brain, the picture could be broader still. Just by inhibiting these steroids everything could start to function very differently.

When the body/mind is under stress, cortico-steroids are produced in the adrenal glands and the brain. There is a recognised link between stress and immune function. When we are stressed our immune function doesn't work so well – we are more prone to catch colds because our resistance is lower. Stress thus suppresses immune function via the cortico-steroids that are structurally very similar to our steroid sex hormones that also suppress our immune function. (That steroids do suppress the immune system is widely acknowledged for they are administered to transplant patients to help suppress the body's immune rejection response to the alien tissue.)

Stress and fear are very damaging. As we have been continually pointing out, steroid hormones are implicated in causing damage to particularly the left cerebral cortex. What is particularly significant is that due to this damage our dominant left-hemisphere self is now reduced to abiding in a perpetual background state of fear that is of course stressful. And this stress presumably results in higher levels of cortico-steroids being produced. Thus within our less than perfectly functioning neural systems, there are loops of damage that interact with one another. If we could be released from all this internal warfare what would emerge? Could we have a lost layer of function that is latent and just waiting to be kick started or would it just be a relief to be free from the chains of fear?

When we meditate we reduce our internal levels of stress. We know too that meditation results in more melatonin being produced that will suppress steroids that in turn will enhance immune function. Meditation also affects consciousness. Reaching a state of quietness by calming the internal verbal dialogue suggests shifting the balance away from left hemisphere dominance. Less stress means less cortico-steroid activity which leads to less negative impact on the immune system. All these elements will improve health and well being. Under right hemisphere control, the thymus gland may work a little better too.

There are clues that at least tentatively point to the possibility of latent and enhanced physiological (and consciousness) functions within some humans. We have touched on this before. People with multiple personality disorder, for example, can heal at a faster rate than is normal. Perhaps they are not so locked into one neuroendocrine control loop but are at least partially shifted to the other. This of course presupposes that each side of the neo-cortex has its own version of a one time cohesive system. It is the most evolved layer of the brain and, though we mustn't ignore the roles of the other layers, it can be regarded as the final 'filter' and the ultimate controller. The neo-cortex has no direct links to, for example, the organs of sensory perception such as the eyes but such information does come up through it from the lower levels of the brain. And it puts its own 'spin' on this information which fine-tunes function and perception. If the right neo-cortex runs a more efficient neuroendocrine system than the left (because the left is damaged) it may explain many anomalous events in the healing arena. And as the neo-cortex fine-tunes many other functions too, shifting left hemisphere dominance may result in a body run in a much more efficient manner. Even our digestive system could be affected by such a change.

A SECOND BRAIN ~ψ~

Research by Dr Micheal Gershon has shed new light on the murky world of animal digestion that is of significance to our own story. Almost single-handedly, he has elevated what is generally regarded as a mundane process to the dizzy heights of neuroscience. He has shown that the gut is definitely more than a tube that processes food. It contains a highly complex neural system and displays a great degree of autonomy.

Gershon's major breakthrough came about when he demonstrated that serotonin was extremely active in the gut. In fact, it is now known that the gut uses 95% of the body's serotonin. Since his initial discoveries, every neurotransmitter known in the brain has been found in the gut too. Furthermore, the human gut has a complex self-contained nervous system containing more nerve cells than the spinal cord, and indeed more neurones than all the rest of the peripheral nervous system. There are over 100 million nerve cells in the human small intestine alone. Structurally and neuro-chemically, the enteric nervous system (ENS) is a brain unto itself. Within those yards of tubing lies a complex microcircuitry driven by more neurotransmitters and neuromodulators than can be found anywhere else in the peripheral nervous system.

Though connected to the brain by the vagus nerve, it has been found that the gut has a great degree of autonomy. In 1899, physiologists studying dogs found that unlike any other reflex, the continuous push of material through the digestive system (now called the peristaltic reflex) continued when nerves linking the brain to the intestines were cut. The vagus nerve only directly connects with a comparatively tiny number of gut cells and while it has overall control, the brain does not instruct the gut *how* to carry out specific tasks. That is strictly an inside job, and one that the gut is marvellously capable of performing. In addition to propulsion, the ENS bears primary responsibility for self-cleaning, regulating the luminal environment, working with the immune system to defend the bowel, and modifying the rate of proliferation and growth of mucosal cells.

The gut is a major 'immune organ' too, containing more immune cells than the rest of the body combined. The enteric nervous system interacts intimately with the immune system, and can affect mood and behaviour by signalling the central nervous system. Indeed, the vagus nerve mostly carries information from the enteric nervous system to the brain not vice versa. For every one message sent by the brain to the gut, about nine are sent in the other direction. Feelings of fullness, nausea, the urge to vomit and abdominal pain are all the gut's way of warning the brain of danger from ingested food or infectious pathogens. And recent research has found that stimulating the vagus nerve can have antidepressant and even learning-enhancing effects. Gut feelings are genuinely more than just a metaphor. We could go so far as to say that the gut can even modify who we are.

Melatonin may play its part in this. Though the pineal is responsible for most of the melatonin that circulates around the body, it is now known that synthesis of melatonin can occur locally in cells throughout the body. The gastrointestinal tract is a major source of extra-pineal melatonin. Here melatonin protects the gut from ulceration by its antioxidant action, by stimulating the immune system and by fostering microcirculation and epithelial regeneration. We also know that melatonin monitors our mood, thus it is

possible that gastrointestinally produced melatonin may play some part in our feelings of well-being.

There are clinical implications to all this too. Because the neurotransmitters and neuromodulators present in the brain are nearly always present in the bowel as well, drugs designed to act on serotonin metabolism are likely to have enteric effects. About 25% of patients taking antidepressant medicines report some initial nausea or diarrhoea. Mood-altering drugs like Prozac, acting simultaneously on both brain and gut systems, may have even more effect on the bowel than on the brain, because serotonin predominates in the bowel and the drug moves through the digestive system before reaching the brain. Fortunately, in most people, the bowel quickly develops tolerance to these drugs, and gastrointestinal side effects usually subside within a few days or weeks of the start of treatment.

Despite many interesting findings, research into the second brain is still in its infancy. For instance, it has been found that there are more serotonin receptors in the gut than there are known functions of serotonin. We have no idea yet what most of these enteric receptors for serotonin are doing.

From our perspective these discoveries have great significance. Our digestive and assimilation system is effectively a tube of complex neural tissues, as responsive and delicate as our cerebral brain and running on the same biochemistry. We are dependent on our gut for the assimilation of our biochemical raw materials. If the balance of steroid hormones and hence neurotransmitters has been upset, this will affect how the very delicate gut mechanism works. If the gut is not at optimum function then the assimilation and absorption of essential nutrients will be impaired.

The accepted diet of our forest ancestors was a rich mixture of leaves and fruit. Each element of this diet contained thousands of unique chemicals. Whole groups of these chemicals are known to affect neural biochemistry and some in similar ways to anti-depressant drugs. Both elevate the activity of neurotransmitters. In addition some fruits are rich in monoamine oxidase inhibitors. Figs for example, a favourite of primates in Africa, provide a MOAI rich meal throughout the year. For perhaps millions of years a diet of several kilos of plant material loaded with thousands of chemicals were eaten every day. These chemicals could have been an integral part of the operating biochemistry of the second brain. The gut as well as the brain developed and adapted in response to this high-powered fuel. The chemically rich fruit diet may have had a parallel affect on both the gut and the brain. Both 'neural systems' use quantities of neurotransmitters such as serotonin. The gut could have evolved a unique way of assimilation, which may have been partially dependent on the continued flow of chemicals such as MOAIs absorbed from fruit passing through it. To suggest that this diet could be replaced without effect seems untenable. The loss of forest biochemistry alone has profound implications for the functioning of the digestive system.

It must be remembered that, via the vagus nerve, there is a direct connection between the two neural systems of brain and gut. It has been demonstrated that there is a two-way traffic of information passing between the two systems influencing the function of both. If our hypothesis is correct and we have a central brain, running below its true potential then obviously the neural input into the gut is going to be less than optimal. Thus, at some time in the past, there may have been a more unified and powerful connection between gut and brain. If our brains were once much more functional, then all

the systems of the body would have run more efficiently and this would, of course, include the gut. Perhaps during our development, as a result of our specialist fruit diet and an increasing synergy between the two neural systems, a new layer of function emerged to form a unified and powerfully efficient 'neural assimilation system'. We can conceive that the vagus nerve link with the brain is today a poor relic of what it once was and what it could be again. If our right hemispheres achieved dominance over the left or in the days before dominance became a problem, the vagus nerve rather than being a mere conduit for the flow of information could act or have acted more like the corpus callosum. The second brain could even have been something like a third hemisphere!

It is easy to see that the loss of our ancestral dietary biochemistry plus less than optimal central control from the brain would result in a gut system that is suppressed. If we could restore the missing biochemistry and shift the cerebral balance toward more function, a different level of digestion and assimilation may emerge. Just eating more figs would not be enough! To fully engage the system, appropriate biochemistry plus a significant shift in cerebral dominance would be needed to allow the cerebral and digestive neural systems to reach optimum function. A combination of an enhanced neuroendocrine function and enhanced communication between the brain and the gut (flowing from the shift in cerebral dominance) plus the direct effects of diet may be enough to engage a level of function well outside current norms. Without such changes our cerebral dysfunction may be perpetuated by a chronically inefficient assimilation system.

Gershon and others point out that a rise in serotonin in the gut can bring on diarrhoea and increasing it further can create constipation. It is interesting to note the comparison between this observation and the effects of prolonged sleep deprivation (increasing a shift to right hemisphere control) on bowel function. We noted in chapter one that, after two days of no sleep, Tony had a brief experience of diarrhoea that resulted in the expulsion of partially undigested food. This was followed on day five by something that, though not constipation, was an unusually small, dense bowel movement. The gut area itself changed shape. It became somewhat rounded, sensitive but free from any tension. Tony reports that it felt like having a living being where once something dormant went through its motions asleep; an active rather than a passive gut. Could this have been the first stage of a transition to a gut with an enhanced function?

Gershon's fascinating research has taken no account of human origins in regard to forest biochemistry. What he has done is to show that the gut is an extremely sensitive and delicate system. In our evolutionary past, this system would have been flooded with a complex and unique biochemistry. Gershon, in a personal communication, has commented that if the primordial diet were rich in serotonin or monoamine oxidase inhibitors, it would have profoundly affected the evolution of the gut. 'The lining of the bowel is rich in monoamine oxidase and the cells can take up serotonin so that monoamine oxidase and other enzymes can inactivate it. Serotonin in the lumen of the bowel stimulates the peristaltic reflex and would cause the luminal content to be propelled very rapidly.' He agrees therefore that, at least in theory, a diet rich in fruit would have had some sort of effect. That effect may have been profound.

Our neuroendocrine, immune response, and assimilation systems are all closely linked and are ultimately linked also to our sense of self. They are all interdependent parts of a wholly unique system that was once fuelled and built from tropical forest

biochemistry. The effects of the loss of this supporting biochemistry on each part of the system could have been significant. Furthermore, as optimum function of one part of the system depends on optimum function of the rest then any loss of function in any part would create a domino effect. To redress such a loss would need combined and simultaneous consideration of the whole system not its component parts. As they evolved together and are all inter-dependent, for a real restoration, all our depressed human systems would need re-engaging simultaneously.

SUPERMAN/SUPERWOMAN ~Ψ~

Then there are the stories of miraculous feats of endurance and physical performance. A recent television documentary covered the story of a man involved in a shipping accident who fell into the sea. He should have died quickly from the low temperatures. However, he not only survived but also rescued a few other floundering people along the way. When he was finally picked up, and was safe in a helicopter, he described a mental state of surrender. It was if something more functional and powerful took over. Many similar cases suggest that in situations of extreme danger or high stress the left hemisphere gives up control because it cannot cope, thereby allowing the more efficient but usually suppressed right hemisphere function to kick in. There are many stories in this vein – colossal acts of strength and heroic valour that are remembered for an effortless dream-like quality that often incorporates mental states of clarity and fearlessness.

The annals of sport are full too of instances of extraordinary performances that seem to go beyond the normal range of human accomplishment. Rhea White, co-author (with Michael Murphy) of ‘The Psychic Side of Sports’, has collected over 4,500 of these stories, many of which appear to have a quasi-spiritual aspect. In one example, John Walker’s description of his win in the 1500 metres at the 1976 Olympics suggests that an altered mind state was a crucial factor:

‘... when I hit the front I got a flash of compelling certainty. I didn’t look over my shoulder, but I sensed someone coming up on me fast ... I was already at full stretch. But I went into a sort of mental overdrive, and my subconscious mind took over completely – I’ve experienced it in races before and I can’t explain it. I burned Wohllhuter off and went to the tape with my hands over my head.’

There are instances too when players have accessed heightened levels of strength. Sam Davis, the ‘Pittsburgh Steeler’, talking about his team-mate, Joe Greene, said that, although under ordinary circumstances he was not one of the team’s strongest men, in the heat of a game, he had the ability to lift two guys. Davis was always amazed at this display of physical prowess. There are further cases of extraordinary strength to be found within the arena of martial arts. Morehei Uyeshiba, the founder of aikido, is said to have lifted a large boulder that ten labourers had been unable to move, and Don Buck, the karate sensei, is known for his eerie power in winning arm wrestling contests – on one occasion by using his little finger only.

The training, discipline and focus involved in sport appears to act as a prerequisite that can release another layer of function that is characterised by enhanced abilities and altered mind states. An aspect of this phenomenon is the 'effortlessness of performance' that is summarised by the cliché, 'he or she makes it look so easy'. The golfer, Bobby Jones was a natural player who commented:

'Of all the times I have struggled around the golf course, there are a few easy rounds that stand out in my memory. ... Strangely, perhaps, one thing stands out about all these rounds: I had precisely the same feel on each occasion; I was conscious of swinging the club easily and yet without interruption ... I had to make no special effort to do anything'.

And another instance of this sense of easiness, is related by mountain climber Lionel Terray who, after weeks of climbing in the mountains, noted an ease and rapidity of movement that he regarded as almost unnatural:

'We could run uphill for hours, climb faces as though they were step ladders, and rush down gullies in apparent defiance of the laws of gravity. The majority of climbs seemed child's play, which we could do without any particular effort in half or a third of the time taken by an ordinary good party.'

The collected reports demonstrate time and time again that sporting activity has the power to take us beyond the ordinary sense of self and evoke capacities that are generally regarded as mystical or religious. We all know that exercise can give us a sense of wellbeing but sometimes much more dramatic states are accessed. Time may stop still, bodies have been perceived to change shape or size, and sometimes consciousness can become separated from the body. In terms of performance, there can be surges of speed and strength, repeated accuracy and almost superhuman stamina. Feelings of mystery and awe, a calm detachment, perfect freedom or even a sense of unity with all things often accompany this external prowess.

Dr George Sheehan's experience as a runner illustrates this ability to access a part of ourselves that is normally locked away:

'The first 30 minutes is for my body. During that half-hour I take joy in my physical ability, the endurance and power of my running. I find it a time when I feel myself competent and in control of my body, when I can think about my problems and plan my day-to-day world. In many ways, that 30 minutes is all ego, all the self. It has to do with me the individual.'

'What lies beyond this fitness of muscle? I can only answer for myself. The next 30 minutes is for my soul. In it, I come upon the third wind (not the second wind, which is physiological). And then, I see myself not as an individual but as part of the universe. In it, I can happen upon anything I ever have read or saw or experienced. Every fact and instinct and emotion is unlocked and made available to me through some mysterious operation in the brain.'

It is particularly fascinating, in the light of our previous investigation into memory, that Dr Sheehan found a way to access what appears to be total memory via the route of physical activity. Can an adrenaline rush explain this, or is this phenomenon better explained by the presence of a normally suppressed second system within us? If adrenaline is the cause, why should it have this effect on memory? Other athletes too have experienced exceptionally vivid memories that are linked to heightened sensory involvement. After a golf tournament, Jack Nicklaus has the ability to recall every shot he made, and American Ball player, Whitey Ford can recall every pitch he made in 3,170 innings. Could the exceptional states of mind accessed during sport determine both the quality of performance and the vividness of the recollection? Do these qualities and abilities indicate that we all have somewhere within us a second layer of function?

Stillness, peace and a liberated detachment from our ordinary (worried) state of mind are qualities usually associated with meditation and deep prayer. But such states can take us over in the midst of extremely focused activity.

When he broke the four-minute mile, Roger Bannister said he felt a 'complete detachment: There was no pain, only a great unity of movement and aim. The world seemed to stand still, or did not exist.' David Hemery, who set a world record at the 1968 Olympics in the 400 metre hurdles, wrote that his mind and his body worked almost as one. His limbs reacted as his mind was thinking 'total control', which resulted in a state of 'absolute freedom'. And the tennis player, Billie Jean King has written about playing the perfect shot:

'I can almost feel it coming. It usually happens on one of those perfect days when everything is just right, when the crowd is large and enthusiastic and my concentration is so perfect it almost seems as though I am able to transport myself, beyond the turmoil on the court, to some place of total peace and calm.'

These floating, dreamlike and ecstatic qualities seem to be associated with what we may tentatively call our 'second self'. When he broke the world record in speed skiing, Steve McKinney recalls that it was like 'riding the substance of dreams, a magic carpet of air, into which power was sensuously entwined'. Marathon runner, Ian Thompson, has only to think of putting on his running shoes to be filled with a kinaesthetic pleasure of floating. Ecstasy is a remarkably common experience felt by many sportsmen and dancers too. Jesse Francis Lewis in a survey of 53 students found that ecstatic experience was accompanied by a surge of energy, and Marghanita Laski, in her own study on ecstasy, found that rhythmic and swift movement was the trigger leading to the such heightened experience. Heinrich Zimmer, a scholar of Indian culture, has pointed out that, like yoga, dance induces trance, ecstasy, the experience of the divine, the realisation of one's own secret nature, and, finally, a merging into the divine essence.

The key to accessing these experiences appears to be activities that encourage us to become free of the constraints imposed by our ordinary self – the self of the chattering mind. Michael Murphy has pointed out that 'runners, like most dedicated sports participants, learn to push beyond the limits and recognise the unexpected second energy, learn to endure the nay-saying voices until a new found strength arrives'. Something needs to be broken through, it seems, to reach this new level of being, and that

something, we suggest, can be identified as the dysfunctional left hemisphere's sense of self. This view is strengthened by the experience of Mike Spino who, after an extraordinarily fast and effortless run, found that:

'When the run was over conversation was impossible, because for a while I did not know who I was. Was I the one who had been running or the ordinary Mike Spino? I sat down by the roadway and wept. Here I was, having run the entire six miles on a muddy roadside at a four-and-a-half minute pace, which was close to the national record, and I was having a crisis deciding who I was.'

It is theoretically possible that, this break from the normal ego sense of self entails a shift into a more primitive level of brain function – an animal level in which physical movement is enhanced. But, as such fluid activity is often accompanied by, what we could regard as, the 'highest' mystical or transpersonal states, something much more interesting could be happening; a shift to a second self with a very different sense of identity and enhanced abilities. Whatever the case, one thing that seems undeniable is that the left hemisphere's linear sense of self appears to have serious problems with all this. All it can do is sit down and cry!

Sometimes after the event, when a more usual consciousness is resumed, these altered states can be felt as frightening. Perhaps it would be more accurately to say that something within feels fear when it re-establishes its own centre of self. When Bob Beamon broke the world long jump record, by the astounding measure of nearly two feet, he could not believe it. Waves of nausea rolled over him, his heart started to pound and he saw stars in front of his eyes. Athletes can find that such extraordinary, one off performances go way beyond what the logical mind can accept and understand. A conflict arises within that is felt, in extreme cases, as terror. How can we explain this? It seems to us that the ordinary linear mind, that is constantly attempting to maintain a veneer of control, at these times is having its authority threatened by the undeniable display of second self function. Its response is its habitual one of confusion and cover up overlain with fear.

Murphy has also pointed out that 'many athletes have trouble recapturing peak moments, because they have trouble incorporating the meaning of these experiences into the rest of their lives'. We would suggest that it is just their ordinary mind that is having the trouble here, and it is to be expected. Such peak performances, like dreaming and hypnosis, do not happen within the arena of that self. It seems sportsmen are reaching these exalted places almost by accident. The left hemisphere sense of self and its control is being overridden without it really noticing, but, when it does, it reacts with fear and confusion. There is an old Indian story that tells of a thief who pretended to be a yogi in order to escape retribution. His dedication to the pretence was so good he became enlightened! The parallels with athletes are obvious. They practise, focus and concentrate for the sake of their craft, and occasionally catch glimpses of spiritual freedom through the discipline. The meditation master may try to overcome the 'monkey mind' - a term given to the unruly ego-based mental system - more directly!

Being truly 'in the present' can be the bridge to this goal. Being in the present is, of course, a core part of the transformative process of particularly meditation-based religious practice. The habitual mind tries to deny or resist the present because it doesn't

seem able to function or remain in control without time. Time is always the past and the future. This mental mechanism therefore perceives the ‘timeless now’ as threatening to its construction of self. As sporting activity is always happening in the ‘now zone’, being controlled from the mental position of past experience or anticipated future is not helpful. This part of the mind is not fast enough to cope with the split second decisions and responses that need to be made during the heat of activity. It also seems that when we access the part of us that functions within the ‘now zone’, the ego-based habitual mind is no longer present. This feels very good and is why sport (and meditation) can be ‘addictive’! The Formula One Motor Racing hero, Jochen Rindt, once said that, when driving: ‘you forget about the whole world and you just ... are part of the car and the track. It’s a very special feeling. You are completely out of this world. There is nothing like it’. Golfer Arnold Palmer noted too that his concentration on the shot at hand went with a heightened sense of presence and renewal that endured through an entire round.

Once released from the ordinary mind it appears that a second system can then begin to operate, and its operation is highly functional. E.J. Harrison tells of a demonstration, given by Matsuura, a high-ranking instructor at the Kodokan School of Judo, that clearly demonstrates this point:

‘Sitting on his knees with his back to me and his hands together, he made his mind blank of any conscious thought. The idea was that I was to remain behind him for as long a time as I desired. Then with all the speed and power I could muster, I was to grab him by the throat and pull him over backwards. I sweated it out for maybe two or three minutes without making a move. Then I put all the power and speed I could into the effort. My next step was to get up from my back where I landed in front of him. His explanation was that the action was not conscious, but rather sprang from the seat of reflex control, the tanden, or second brain.’

Accessing what some people assume to be an ‘unconscious reflex’ is a secret that lies at the heart of enhanced sporting performance. In *Zen and the Art of Archery*, Eugen Herrigel was taught that the shot would only go smoothly when it took the archer himself by surprise. He was taught not to open his hand and release the arrow with directive purpose. The thinking, planning mind is regarded as an obstacle. American sportsman Catfish Hunter’s description of his experience of ‘the perfect game’ further illustrates this point. He said: ‘It was like a dream. I was going on like I was in a daze. I never thought about it the whole time. If I’d thought about it, I wouldn’t have thrown the perfect game – I know I wouldn’t.’ Perhaps we can ask, if the thinking mind is no longer operational at the times, what is in control? How is the system being run? Whatever is in control, not only appears to be much more efficient, but the effect on consciousness also seems to be extremely positive. When we need fast reaction times, we need to leave our thinking mind behind, and fast and focused sporting responses will precipitate the shift. The result is fluid and accurate performance that is often accompanied by semi-mystical sensations of exhilaration leading to outright ecstasy, and even feelings of transpersonal unity. Basketball player Patsy Neal waxes lyrically about such experience:

‘The athlete goes beyond herself; she transcends the natural. She touches a piece of heaven and becomes the recipient of power from an unknown source.’

The power goes beyond that which can be defined as physical or mental. The performance almost becomes a holy place – where a spiritual awakening seems to take place. The individual becomes swept up in the action around her – she almost floats through the performance, drawing on forces she has never previously been aware of.’

Perception may be altered too. Sometimes this may merely be a heightened sense of alertness but there are reports of definite shifts in time and space. Some athletes claim, during the rush of activity, to be able to perceive more detail and have much more vivid field of vision than in ordinary states. This can often be of great help to the task at hand. Objects can appear to be larger than they are in reality – to a golfer the hole can become as big as a wash tub so that it feels impossible to miss. Baseball players talk about how large the ball is when they are batting, and basketball players sometimes perceive the hoop as ever expanding circle! Such perceptual shifts have also been elicited by hypnosis. Could something similar be going on here? Does the root of these entire experiences lie in a shift to what we call the second self?

Seeing auras and energy are amongst the most extreme but most fascinating perceptual changes experienced in the field of sport. Such things are more often associated with the world of yogis, saints and shamen, or even schizophrenics and hallucinogenic drug-takers. American footballer, David Meggyesey suffered a blow to the head during a practise game. As he sat on the sidelines in a semi-dazed state, he felt an eerie calm and beauty, and had impressions of outlines wavering gently in the fading light. This led to the perception of auras around some of the players. This opened the door to further experiences. In another game, he found himself playing in a kind of trance where he could sense the movements of the opposing players a split second before they happened. With this heightened sense of anticipation, he played a brilliant game. But was it anticipation?

Stunning research by B. Libet has shown that brain activity begins about half a second *before* an individual is aware of deciding to act. This implies that our habitual consciousness lags behind the events of the world – a very problematical anomaly. What could be going on here? During our investigation into schizophrenia in the last chapter, we noted the phenomenon of voices in the head anticipating what the schizophrenic individual was attempting to put into words. Could this be related to the anticipation experienced by David Meggyesey? Perhaps it could best be explained by the presence within all of us of a second consciousness/second self-system that operates in real time, (or even possibly within something outside linear time). This ‘second self’ can respond with much greater speed and accuracy, which is why within martial arts the aim of training is to reach this place of ‘beyond our normal conscious action’. The evidence appears to indicate yet again that our ‘normal conscious self-system’ is less functional than we suppose it to be. If it lags behind what is really going on, and makes up visual and mental compensatory links, the Hindu/Buddhist concept of Maya – the world of illusion – becomes more than a theoretical possibility. Are we all lost in the illusion of a supposed reality created by a damaged but dominant left hemisphere sense of self? Is there a greater reality available to us that, for most of us, is only accessed rarely within the realms of mystical endeavour or extreme activity?

Murphy and White conclude in their book that:

'...the very fact that such experiences arise spontaneously in many people suggests that they are a fundamental part of human nature. The fact that they burst in upon so many of us might indicate that we are designed to use them. Perhaps these strange abilities are part of a larger awareness and capacity that is pressing to be born. ... If a large-scale enterprise were mounted to explore these immense potentials of human nature, who knows what discoveries could be made. ... These extraordinary capabilities are probably only a glimmer of what human beings can achieve. We simply don't know the limits of long term research into these phenomena.'

We can only concur, with the proviso that we feel these abilities are not some new evolutionary advance waiting to happen. They are already part of us. They evolved with the rapid expansion of our human brain but somewhere along the road became progressively submerged. Today, accessing this second layer of function is a 'hit and miss' affair, but, with a sustained programme of research, a restoration of this lost area of consciousness may be possible. If we have suffered a degeneration of consciousness what could be more important than ascertaining the extent of the problem and realising a solution?

SUMMARY ~ψ~

We have come to the surprising conclusion that our normal state of body/mind is not only dysfunctional but that a much more functional state is hidden behind it. If we look dispassionately at areas such as human fertility, immunity and even baldness, we find evidence for a degeneration within these systems that appears to have been caused by an imbalance in steroids.

The key hormones in the story are testosterone and oestrogen. Either higher levels of these steroid hormones or, more accurately, an increase in their activity has precipitated a train of events that has upset optimal human performance. This has had profound repercussions on both our physical being and our consciousness – indeed, down to the very way we think. Sometime in our evolutionary past, these steroid hormones were suppressed and this suppression played a pivotal role in our unique human development. The key steroid inhibitors, that have become the heroes of our story, are melatonin, beta-carbolines and the vast numbers of chemicals, such as bioflavinoids, found in fruit. We are suffering today from a chronic shortage of these crucial chemicals, and, as there is a link here to the pineal gland, we can also say that today this gland is not as active as it should be.

These ideas challenge many firmly held (but decidedly shaky) scientific theories that range from the descent of man to the rationality of our intellect; and even to what we should be eating. But together, all the anomalies we have looked at inexorably point to the conclusions we have reached. We know from research that testosterone effects the neural cells in the left hemisphere, and that melatonin can suppress the female fertility cycle. We also know that steroid hormones affect the thymus gland - it shrinks at puberty. But, if steroids are suppressed, the thymus can reboot and massively enhance the immune system. Put all the pieces of the jigsaw together and it builds a clear picture that shows

that increased steroid activity has dramatically affected all our consciousness, fertility and immune systems.

Today the factors that created an inhibition of steroids during our most rapid phase of evolutionary development have been well and truly removed. In fact our recent dietary history, together with our modern way of life, has made the problem worse because these things add to our steroid burden. This has left us with an inability to cope, and we can see the resulting breakdown all around us. Nobody has seen the relationship between all these factors before because we have been looking intently at the individual pieces of the jigsaw, not the whole picture. A Native American Chief once told Carl Jung that he found white people to be always uneasy and restless. He could never fathom what these newcomers to the land of his forefathers wanted or for what they were so restlessly seeking. He concluded that they were mad. If we look dispassionately at our society and ourselves we can only agree with him. There is a profound discontentment in us that has resulted in an extraordinarily violent civilisation, which has become a threat not only to itself but also to all life on this planet.

If we can recreate our ancestral hormonal environment through diet and particularly a sustained reversal of cerebral dominance, a very different human may emerge. One with enhanced perception, a stronger immune system, more balanced dexterity, more efficient digestion and greater physical and mental capability. We would experience more profound and pleasurable sexuality too, coupled with a reproductive system that worked as nature intended. Even baldness would no longer be a problem. Most crucially, society would become much less aggressive and violent because our sense of self would change radically. Such a restoration of a balanced consciousness with all these attendant benefits is more than a theoretical possibility.

Could this knowledge, or at least some of it, have been available to our ancestors? There is a widespread belief from around the globe in the fall of mankind. It is a theme present in all our religious literatures and is told in many folk stories. Could there be an underlying and hidden message within our religions and archetypal tales? A message that not only highlights what we have lost but how we may be able to get it back. These are ideas we will explore in the next chapters.

