For evolutionary psychiatrists, psychologists and others interested in sociophysiological Integration

ASCAP

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"It is almost true to say that Turing succeeded in his analysis because he was not familiar with the work of others. Let us praise the uncluttered mind." Robin Gandy

Quoted in Dyson G: Darwin Among The Machines. NY: Penquin Books, 1997, p.55

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The Across-Species Comparisons and Psychopathology (ASCAP) Newsletter is a function of The ASCAP Society & of The Psychotherapy Section of the World Psychiatric Association

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ASCAP Society Mission Statement:

The ASCAP Society represents a group of people who view forms of psychopathology in the context of evolutionary biology and who wish to mobilize members and resources of various disciplines so as to enhance the further investigation and study of the conceptual and research questions involved.

This scientific society is concerned with the basic plans of behavior that have evolved over millions of years and that have resulted in psychopathologically related states. We are interested in the integration of various methods of study ranging from cellular processes to individuals in groups.

The ASCAP Newsletter Aims:

♦A free exchange of letters, notes, articles, essays or ideas in brief format.

♦Elaboration of others' ideas.

♦Keeping up with productions, events, other news.

♦Proposals for new initiatives, joint research endeav

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The World Psychiatric Association is an organization of psychiatric societies aimed at advancing psychiatric and mental health education, research, clinical care and public policy.

The basic members of the WPA are 110 national psychiatric societies, representing more than 140,000 psychiatrists worldwide.

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ADDRESSED TO & FROM ...

Madison Institute of Medicine

This will be the last *ASCAP* mailing from UTMB. We wish to thank that institution, Robert Hirschfeld, Chairman of Psychiatry, Jeff Matthews, Patricia Birkmeyer and Gloria Gonzales for their work during the time since I've been there. UTMB has been most hospitable.

Jeff Jefferson & John Greist originated the Madison Institute of Medicine as a nonprofit organization that distributes information (they originated the distinguished Lithium Information Service). We are pleased at their enthusiasm for distributing ASCAP and being otherwise hospitable to us.

Russell Gardner, Jr.

ASCAP Used for Teaching

I am very grateful for the 1999 issues of *ASCAP that* I received. Some articles have been found much useful for my lecture among psychiatrists, especially those pertaining to depression. This includes the diverse works about the Theory of the Triune Brain, the works by John S. Price in No. 5 (May issue), Russell Gardner in No. 6 (June), Dylan Evans in No. 3 (March), and Tyge Schelde in No.10 (October).

I will subscribe for next year.

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How We Relate to Computers

Went to a conference at MIT on affective (sic) computing, which is to say, the use of computers to monitor, respond to and modulate emotions. Overall this was interesting but one presenter, Bryon Reeves, actually had an evolutionary perspective!

Reeves argued that people relate to computers in a manner similar to the way they relate to people who are "close" to them. Example: the politeness rule. If someone asks you "How am I doing?" people generally give only positive feedback. However, if a third person asks you "How do you think that guy's doing up there?" you will give much more honest feedback.

It turns out, that if after being tutored by a computer, it asks you for feedback on its performance, you rate it much higher than if a second computer asks you about the performance of the first computer. !!! We dont have an algorithm for dealing with computers so we use the pre-existing algorithms. We don't simply invent completely new, specific, ways of dealing.

So there is a cognitive EEA as well as a social one, or maybe the two are the same.

Ah, he actually said that our responses to computers are "social" but at the time i didn't grasp what he meant.

Reference: Reeves B, Nass C: The Media Equation : *How People Treat Computers, Television, and New Media Like Real People and Places.* New York, NY: Cambridge U Press, 1999.

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Pets Have Human Meaning (from Paleopsychology List)

How can you be angry at the world or depressed when a tiny little creature is looking at "you" for guidance?

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Pets are very kind. They put as at number one in their hierarchy, love and need us incessantly, want to rub up against us and be rubbed, and are delighted when we reaffirm our primacy overthem and our superb ability to pilot them through the twists and turns of fate by feeding them and occasionally taking them to the vet. In other words, they give us the social signals we, as nodes in a learning machine, need to keep our hormonal system and our ebbing spirits operating at peak performance, or on bad days, at least endurable performance. No wonder the research shows that having pets lowers our mortality rate.

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I am back at the "experiential" level with our chickens, geese, rabbits, dogs & cats. Lorenzian experience, that he submerged himself in - and worked into a Nobel prize. Tremendous outlet for mothering! However, there is much more to the parody: soap opera (stories, anecdotes)! If you have a flock of reproducing chickens, who needs TV? If you know individuals and observe them and know something about the greater social structure of the species - well, it's hilarious! Pets are a source of release for our mothering instinct, plus as providers of a steady stream of anecdotes to share.

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The Empathic Parrot

I had the pleasure of meeting an African gray parrot with a good vocabulary and empathic behavior toward her cancer patient owner (now deceased). What a remarkable little bird! I learned from his widow, that the bird knew when to be quiet and when cuddles were needed as the man was slowly dying. Though very young, she sensed that her natural exuberance had to be controlled at times. Her name is "Miss Buddy" and was purchased as an infant to cheer up the cancer patient. She has a vocabulary of about 250 words, which it uses in context much of the time.

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From Where Come Ghosts?

Go back a few million years, to hominids cowering in their thorn-domed nest at night, hearing approaching or passing foot-steps. Only the imagination can create a picture of what is out there, and you may have to prepare to deal with an investigating predator- of which species?

Actually we can - with some training - operate surprisingly well at night. See Jim Corbett's writings in hunting down man-eaters in India. Also Erwin Rommel's successes, in the 1st WW, were built on training his infantry in night-tactics. Read all about it in *Infanterie Greift An.* That book made him a Field Marshal.

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Crustaceans Have Social Life Too

Articles written by such observers of animal behavior as Alan Dixson (A.F. Dixson et al: Male Dominance and Genetically Determined Reproductive Success in the Mandrill *(Mandrillus sphinx). Primates,* 1993:525-532) are about 30% aided by current theory and 70% hindered by it. I find it impossible to hold discussions with many naturalists who study mammals and birds because of their rigid adherence to current neo-Darwinian doctrine. On the other hand the crustacean folks are less doctrinaire, but have for some inexplicable reason asked far too few questions about the social behaviour of the spiny lobsters, crayfish, and lobsters they study. They spend enormous amounts of time studying hierarchical societies which consist of up to ten thousand individuals, yet havent bothered to see how and why these groups cohere, what influence leaders have, etc. The crustacean folks are very friendly, very willing to give information, and very puzzled by any questions about social behavior. Unlike the primate and bird folks, they may need a few shots of theory to open their eyes. But hopefully a batch of theory more open and syncretic than Hamiltonian neo-Darwinism. Poor Darwin. He'd shudder if he knew what sort of mental blinders his name has been used to validate.

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Did Mega-Fauna Affect Immigration to the America? A Researchable Question

The New York Times on November 9,1999, published "New Answers to an Old Question: Who Got Here First?" by John Noble Wilford.

With Kennwick man, Monte Verde, Luzia and pre-Clovis speculations buzzing about, we all are having a wonderful time!

May I add a zoological twist? You may be aware that I argued in print that late Rancholabrean times were a predator hell-hole that stamped

its characteristics on the whole megafauna, and that humans were most unlikely to colonize North America till the mega-predators of that age, the large Arctodus simus in particular, were on the way out. That happened in the Older Dryas, allowing on one hand a rebound of ungulate populations (which Jerry McDonald documented in his PhD thesis some time ago), and on the other hand it opened the way for a peopleing of the continet. The Rancholabrean megafauna probably kept people out for about 20-25,000 years. However, that would not have stopped probing by "boat people" coming south along the Pacific coast. If so, they left an obvious zoological footprint: extermination of edible island faunas on predator free islands. Under such circumstances herbivores dwarf. The Channel islands off Califomis had dwarfed American mammoth. These would have fallen victim probably to the very first boat probe moving south aslong the Pacific coast. When did the dwarf mammoth die out? A most interesting datum to bear on this point hinges on what carbon dating says.

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From Where Do Hallucinations Stem?

Read this AP story I found dated November 7. The last paragraph is really interesting. It has some of the components found in MacBeth, the secret crime is 'punished' even before others discover it and demand justice.

'She Realized It Was Over'. Mother Charged With Murder of Child 20 Years Ago; Body Discovered in Closet Saturday

A Brooklyn woman was charged with murder Saturday after the body of her daughter, dead since 1979, was discovered in her bedroom closet. Members of the Cold Case Squad discovered the body of Latanisha Carmichael on Friday after receiving a tip that a child's body was being stored in a home on Rockaway Parkway. While executing a search warrant at the home of 60-year-old Madelyn Carmichael, police discovered her daughter's body. It had been covered with moth balls and wrapped in a plastic bag, then stuffed into a foot locker in the back of the closet, said Sgt. Rafael Andalia, a police spokesman. Latanisha Carmichael was about three or four years old when she died.

Madelyn Carmichael had no criminal record, but two other three living children were taken into foster care in the eariy 1980s as a result of child abuse, The New York Times reported. Police believe Latanisha had a twin brother, one of the two children taken by child-welfare officials, according to the Times. An older son stayed in Carmichael's care and visited her regulariy, neighbors told the paper.

Cold Case Squad Capt. Ray Ferrari said that Carmichael became agitated and appeared to nearly suffer a seizure as the police opened the closet. "My impression was that she realized it was over," he said.

Residents of the apartment building were shocked to learn their neighbor had been charged with murder. They said she had often complained about hearing babies crying or children playing, although there were none on her side of the building.

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Phaistos Disk on Wall

I mailed the book you requested that I wrote, *Obsessive-Compulsive and Related Disorders in Adults: A Comprehensive Clinical Guide*.New York: Cambridge University Press, 1999.

Thank you for the copies of *ASCAP* The evolutionary perspective is broadening. I particularly enjoyed RG's article on "Sex of Bronze Age Cretan Leadership." I have copy of the Phaistos disk in my office!

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Quote from the new book (p.7):

"Our responsibilities as physicians have remained constant for several thousand years - to express genuine caring, to relieve suffering and restore functioning as best we can, to find the most recent knowledge and use it to benefit the patient, to educate, to maintain home, and to share our discoveries with our colleagues."

ARTICLE :

by David A. Evans

On Aesop's Fables

AESOP'S FABLES would be high on my list of books that have taught me about life. These stories are not so much prescriptions on how to live your life as they are wise descriptions of how life is lived; in other words: what it's like to a be an animal—a human animal and not just a wolf, a lamb, a crane, or a grasshopper. The very fact that Aesop is describing non-human animals in these wonderful stories, and not talking about humans, is itself a lesson. If there's anything Aesop has to tell us, it's that what we think we see and what really is there are quite often two different things.

Darwin or Plato or Shakespeare or Freud couldn't have taught Aesop much. When a lamb gives a wolf all sorts of arguments for the wolfs not eating him, the wolf eats him anyway, saying, "Well, I won't remain supperless, even though you refute every one of my imputations." What's the lesson here? It's simply that there's nothing more basic to an individual than his or her survival. Amen.

Aesop knows that we all expect rewards for our work. When a wolf gets a bone stuck in his throat, he asks the crane to put her head into his mouth and draw it out. The crane gets the bone out, and then expects a reward for her efforts. But the wolf tells her that her reward is "having been permitted to draw out her head in safety from the mouth of a wolf." There's no room for Walt Disney or Lassie in this kind of world, which is the same one, I believe, that William James had in mind when he wrote that life is "a slow advance into enemy territory." And just because we think we deserve a reward for hard work doesn't mean we'll be rewarded. Didn't Job in the Bible learn that same bitter fact? So the story says, "Don't expect too much out of life. Or, put another way by the British poet R.S. Thomas in a poem: "Live large, man, and dream small."

When a farmer has pity on a half-frozen snake and places it on his bosom to warm it, the snake inflicts a mortal wound on him. "Oh," cries the farmer in his last breath, "I am rightly served for pitying a scoundrel." He's right, but, unfortunately, it's too late to be right.

Aesop knows all about the universal discrepancy between words and actions. Some wolves tell some sheep that the sheepdogs should be dismissed because they "bark whenever we approach and attack us before we have done any harm." So the sheep beguile and dismiss the dogs, whereupon the wolves destroy the entire flock, as Aesop says, "at their own pleasure." Again, the lesson is simple and wise: if we really want to know about somebody, we shouldn't listen to their words as much as watch their actions.

Aesop knows, too, that everybody sees the world out of his or her own eyes. A leopard brags to a fox that he's more beautiful because of the beautiful spots decorating his skin; but the fox tells the leopard that, no, he is the more beautiful because he is "decorated, not in body, but in mind." To each his own, in other words.

Does Aesop know anything about motivation? Yes. In the fable of "The Hare and the Hound," when the hare outruns the hound it does so because, whereas the hound is running only for its dinner, the hare is running for its life.

Here's another lesson. A fox sees a lion in a cage, and standing near him, "bitterly reviles him." The lion says to the fox: "It is notthou who revilest me, but this mischance which has befallen me." This too is wise, because it shows us how we ourselves might handle our critics. Why argue with idiots?

And how about kindness and altruism? Did Aesop believe there is such a thing in this precarious, dangerous world? The answer is yes, but with one necessary qualification. Remember the story about the lion and the mouse? The sleeping lion suddenly wakes

up when a mouse runs across his paws. The lion is about to kill the mouse but the quick-thinking mouse tells him: "If you would only spare my life, I would be sure to repay your kindness." The lion laughs but lets him go. Later, the lion is trapped in a snare by hunters. The mouse, hearing his roar, comes up and gnaws the ropes with his teeth, freeing the lion. The mouse, having of course his own ego and pride, says to the lion: "You ridiculed the idea of my ever being able to help you, not expecting to receive from me any repayment of your favor; but now you know that it is possible for even a mouse to confer benefits on a lion."

So kindness and compassion do exist in the world, but not without some benefit to the altruists. If we want to survive—and we do, we do—then we need to show kindness to others, for in enhancing others' survival we are enhancing our own. Put another way by a practitioner of Zen Buddhism: The giver should be thankful." Why don't politicians, generally speaking, ever acknowledge this? Because if they did, they might be accused of not being altruistic or charitable enough, of not "serving the people," selflessly. Evolutionary psychologists have a phrase for what the lion and the mouse did for each other: reciprocal altruism.

What do I get from Aesop, finally? First of all, I get some good and true stories, and good and true stories are, in one sense, their own argument and their own reward. And second, I get a practical philosophy of life, which I can more or less sum up with a little list:

1. Take yourself seriously but not too seriously.

2. Help yourself by helping others.

3. Beware of wolves dressed as sheep, and vice versa.

4. Rely more on your instincts than on your sense of what is "reasonable," but know too that the "reason able" sometimes is the best approach because it is reasonable.

5. Realize that everybody, including you, has ulterior motives all of the time, in other words, people act according to their own self-interest.

6. Trust actions a million times more than words.

7. Realize that your life makes a difference in the scheme of things, but that every other life makes just as much difference as yours.

8. Enjoy and appreciate your days on the earth, and remember always that life is fragile and may be rescinded at any moment; and when it is, you'll neither get nor need any apologies from whoever or whatever has the power to rescind it.

The Houdini of the Heavens

The human is a frightful pest Who,
once he has befouled his nest,
Reaches deep within his pocket To
find salvation in a rocket.

Likewise if the world turns cold His
response is just as bold. As croc-like
tears enmist his eye To mammal pals
he waves good-bye.

'Cos holds, for food, he fills with plants And
spares no space for elephants. For though
his love seems deeply felt It counts as
nought against his pelt.

Indeed, as I respect my skin
I feel it prudent I work in,
P.C. all my work to render,
"This poem applies to either gender".

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ARTICLE:

by Mike Waller

Response to March Issue on Depression & Social Rank Hierarchy

I have been stimulated into writing this piece by two items in the March Newsletter and two contributions elsewhere from the embryologist, Lewis Woipert. The first of the Newsletter items was the very thoughtful essay by Dylan Evans in which he reviewed the strengths and weaknesses of the social competition hypothesis of depression (SCHD);[1] the second was the exchange between our Editor and Donald Klein concerning the tetter's belief that our collective efforts fall short in terms of the rigorous hypothesis testing essential to scientific advance.[2] The Woipert material is an extract from his very recently published *Malignant Sadness - The Anatomy of Depression*[3] and a contribution I heard him make to an upmarket radio "chat show" in which both his new book and his recent experience of the clinical depression which gave rise to it were discussed.

Regarding the *Newsletter* material, I am doubtful as to whether even its strongest adherents would wish or be able fully to meet Dylan's well reasoned objections to SCHD being seen as an all encompassing explicator of depressive illness. As he suggests, postnatal depression is but one case where hierarchical factors do not seem to play an immediate role. And whilst Russ showed his usual mental agility, I have my doubts as to whether his confidence that "twentieth-century dismissal of the possible basic plan nature of social rank hypothesis will give way to their serious testing in the twenty-first century" will fully have assuaged Donald's immediate concerns.

Wolpert certainly has to be counted amongst the sceptics. In his new book, quoting as his source an article by John Price et al, he outlines the SCHD thesis and then goes on to say: "I find this explanation unsatisfactory. It is based on the assumption that depression is adaptive. There are no grounds for believing that simply because it is widespread it serves a purpose, any more than one would claim heart disease or cancer to be adaptive. Quite the contrary. Everything we know about severe depression in humans is that it is an illness; it is pathological and prevents an affected individual from functioning properly. I also cannot accept that humans are in a social hierarchy similar to that of apes where it is a social necessity to withdraw for safety - or even that such a withdrawal is similar to depression."[p.78]

Wolpert took much the same line on the radio programme, setting about a psychoanalyst who dared to argue that depression is Nature's way of telling us to change direction. Central to Wolpert's attack were the crippling psychosomatic effects of depression and the high incidence of suicide amongst its sufferers.

The Woipert passage reproduced above is particularly instructive because it shows both the strengths and weaknesses of his approach. Here and in the rest of the book, as one would expect, his is strong on evolutionary theory and biology in general. He also writes with the investigative zeal of one who has suffered and wants to know why; but on the downside he sometimes shows a puzzling naivete as to the human condition. I find it amazing that somebody who has spent his entire professional life in the cauldron of academic competition could arrive - in his sixties - with no conscious awareness of the pervasive effects various kinds of hierarchy have on the lives of human beings. Here, I think, a seaside postcard I saw some years ago showed much greater insight. It pictured a man with a very worried look on his face staring past the attractive women with whom he was sitting. The object of his attention was an enormous pair of carpet slippers. The caption at the bottom read: "But darling, my husband won't be home for hours". As almost any reader of English seeing the postcard would immediately get the joke, it seems to me that what John Price first told us over thirty years ago reflects a fundamental truth about the human condition. The carrying of a contingent ardour-dampening programme is highly adaptive in a species whose sexual drives -

though not usually lethal - can on occasions create a serious and immediate threat to their continued well-being. Similarly, where continued fighting with a stronger conspecific is only likely to result in serious injury or death, something which "sobers-up" the weaker contestant will almost certainly be to his/her adaptive advantage. With domesticated dogs, inappropriate sexual activity or aggression can be dealt with by a bucket of water. In the natural world a brief douche of depression on the part of the individual under threat can reasonably be assumed to have the same effect.

Thus far I think SCHD has it right and Wolpert has it wrong; but the next step must be to decide the extent of SCHD's proper domain. I would stake three claims for it. First, it is entirely satisfactory in dealing with the type of situation outlined above. We routinely speak of people being "brought to their senses", "calmed down" or "having the smile wiped off their faces" in situations where their activity levels have been high until an hitherto unrecognised risk has been seen or pointed out. The second attribute of this brilliant insight is that it can be broadened to encompass not only a means by which we are stopped from doing what is dangerous. It is also a means by which we are channelled into doing something at which we can show some competence. Thus, drawing on work by Dunbar, Dylan suggested that in a small group of hunter-gathers the depression associated with a sense of failure would cause individuals either to try harder or, if they consistently failed, to search around until they did find a role at which they could make a well appreciated contribution it being "quite likely (in such groups) that every individual could excel in some area".

The third claim I would make for SCHD is that it gives an entirely satisfactory account of how the depressive mechanism came into being. Without identification of these initial adaptive benefits it would be very hard, if not impossible, to come up with a satisfactory evolutionary explanation for the emergence and very widespread persistence of the kind of full-blown depressive illnesses which, as Wolpert so eloquently argues, at the level of the individual are so massively maladaptive. Thus although SCHD may not be able to explain the persistence of the unequivocally maladaptive forms, it does suggest the stepping stone which gave them their evolutionary chance.

But how can we move beyond this to explain the persistence of the maladative forms which so puzzle Wolpert? To do this I am now convinced that we need to look again at the kin selection component of inclusive fitness theory and ask whether there might be circumstances in which the evolutionary interests of a wider kin group might be served by the affliction of one of their number by such a condition. As I revealed in the February Newsletter, I am now working on the lines that there may well be. If we turn back to the Dunbar/Evans 150 strong band of hunter-gathers, it seems to me a tad over-optimistic. I doubt that humans have ever lived in a world in which "every individual could excel in some area". Harsh and unfair though it is, some folks are good at a wide range of things, others good at a few things and yet others (in comparative terms) are not good at anything much at all. Indeed were this not so, it would be difficult to see what raw material natural selection would have to work on.

Now let us imagine that one of these tribespeople has shown themselves to be very poor at killing prey, very poor at tracking, very poor at finding the way home, etc. etc. In conventional Darwinian terms he is the least well fitted of the groups and this is something not likely to be lost on potential mates. The crucial point I now want to make is that this low performer would not just be an embarrassment to himself; he would be an embarrassment to his close kin. Nor is this embarrassment just a social thing, it is grounded in the bedrock of neo-Darwinism. To the modem evolutionist the main significance of kin lies in their sharing common genes; and as natural selection is inevitably way ahead of evolutionary theory, it is not unreasonable to suggest that the shared genes message has not been lost on species which practice sexual selection. Imagine you have a choice between two potential mates, one of whom has kin whose adaptiveness is such as to place them all at or near the top of the performance hierarchy. In contrast, all kin of the alternative choice are positioned well down this hierarchy. Even if in phenotypic terms the two rivals are absolutely equal, is it not self-evident that the

former has a far better prospect of endowing his/her young with outstanding genes - both dominant and recessive - than does her/his rival? Who then would be the mate of choice for any partner programmed to maximise its evolutionary opportunities?

Once we reverse this picture and imagine a generally well-fitted kin group with one comparatively ill-fitted member, the cleavage between the evolutionary interests of the wider kin group and the maladapted individual become clear. If, as has been the case in the past, we focus exclusively on the latter, evolutionary theory reasons that no matter how poor a performer he/she is, the adaptive advantage lies with "hanging on in" to take such limited reproductive opportunities as arise. That is why Wolpert says depressive illness cannot be adaptive; it makes hanging on in so very much more difficult. Looking at the wider kin group turns this on its head. The very marginal reproductive successes of the maladapted individual are likely to be swamped out by the much larger aggregate reproductive penalty paid by close kin as a result of potential mates deducing from that individual that any member of its kin group could carry, as recessives, the genes responsible for the maladaption. From an evolutionary perspective, the harsh truth is that it would be better that the low performer were not there to provide this damaging insight to an otherwise concealed family weakness.

At root, the logic here is not dissimilar from that now accepted as underpinning infanticide and siblicide in many species. In one case it is a question of optimising clutch or brood size in relation to available resources; in the other, optimising family reputation in the context of mate selection. In both cases the general principle has a corollary attached: for sound evolutionary reasons, extinction of the unwanted should be effected at minimum risk to those who are to survive. It would therefore be strongly adaptive if the genotype included a self-destruct programme, to be activated if and when appropriate.

It is at this stage in evolutionary development that I envisage the individually adaptive depressive mechanism at the heart of SCHD being co-opted to serve the interest of the wider kin group. Once labelled by kin, self and significant others as being what, for want of a better, more sensitive term, might be called a loser, the depressive mechanism goes way beyond any possible benefit to the individual and into a sequence which, in the natural world, would speedily result in their elimination. First happening by random mutation, its kin group benefits would be such as to ensure the genes responsible moved rapidly to fixation.

The explanatory powers of this theory seem to me to be immense. For example, it maps on to the commonplace implication, by both professionals and client/patients, of intra-familial relations in the aetiology of mental illnesses. It also explains (a) the now indisputable causal relationship between depression and a very wide range of life threatening physical illnesses; and (b) why the stigmatisation of the mentally ill, those who suffer from disabling physical conditions, and those who behave in ways considered socially unacceptable routinely extends beyond the individual to his/her family.

An additional strength of this proposal is that it is fully open to the kind of hypothesis development and testing for which Donald Klein called. For example, it predicts that concern over social stigma should rise in proportion to what might be termed the adaptiveness gulf between the affected individual and his/her kin. Amongst a kin group consisting entirely of low performers, the least well fitted will have only a marginal impact on the family's mate selection prospects. Within a generally high performing kin group, a single maladapted member should be viewed as a far more serious threat to perceived aggregate mateworthiness. By chance, not long after I first put forward this idea, Phelan et al published a paper entitled "Psychiatric Illness and Family Stigma."[4] The following paragraph from it is of particular relevance:

"Our finding that higher educational attainment is associated with greater perceived avoidance is consistent with previous findings that higher SES is associated with greater perceptions of stigma and more extreme reactions to stigma among relatives.[56] These findings might be interpreted in various ways: Higher-status individuals may be more perceptive of actual rejection, they may be overly sensitive and falsely

interpret others' behaviour as rejection, or their presumably more highly educated relatives and acquaintances may reject mental illness in more stigmatising ways than do people with less education. In any event, these results are particularly intriguing in light of the fact that higher SES has also been linked to more tolerant attitudes concerning mental illness among the general population[8] and among relatives of former patients.[9] This raises the question of whether highly educated people really have more enlightened attitudes towards mental illness or whether they are merely more likely to express socially acceptable views."[p. 124]

If we accept SES as a useful broad-brush indicator of position within the social hierarchy, it seems to me that such findings gel well with the general thrust of my argument.

In closing, may I say that I am not unaware of the difficulties of handling such ideas in a therapeutic setting. However, one hundred years ago Freud's theories concerning sexuality within the family unit must have seemed at least as difficult to deal with. Further more, what I have labelled "Stigma Theory" carries with it the imprimatur Freud strove for but never achieved: a robust grounding in evolutionary theory.

References:

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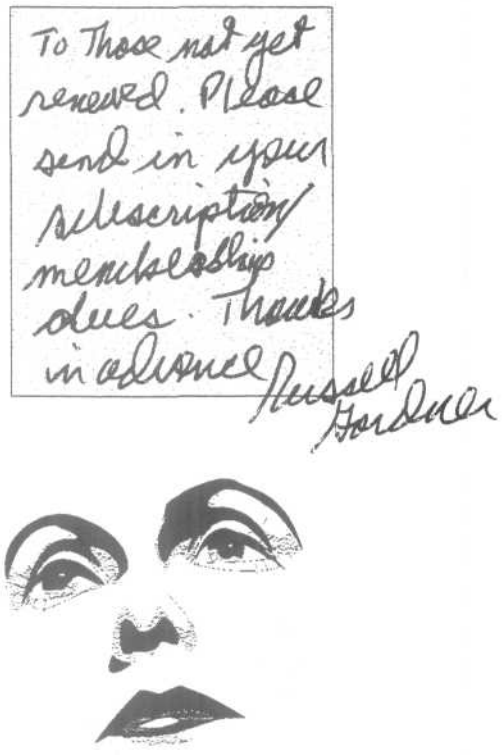

ARTICLE:

by W.M.S Russell

Phaistos Disk Has Been Translated

In the fascinating article on Bronze Age Crete last issue, Russell Gardner described the Phaistos Disk.[1] I thought members of ASCAP might be interested to know that the Disk was deciphered in 1982-1984 by the American-born linguist Steven Roger Fischer, now Director of the Institute of Polynesian Languages in Auckland, New Zealand. He tells the story in his superb book *Glyph-breaker,* which also covers his decipherment of the Rongorongo script of Easter Island, for Fischer is the first linguist in history to have deciphered *two* hitherto mysterious scripts.[2]

The 45 characters of the Phaistos Disk were found to be sound units of a syllabary. The fist big surprise was the language, which turned out to be an early form of *Greek,* different from but related to the Mycenaean of Linear B. The Minoan upper classes were therefore a branch of the Greek people who occupied the whole of the Aegean in the 2nd millennium BC.

But if the rulers were Greeks, the society of Minoan Crete was decidedly multiethnic. The inscription on the Disk urges a number of different groups of peoples to *hear* the message, which was clearly read to them by a herald or town-crier. These people include the Kouretes (as the later Greeks called the ancient Crtetans), the Danaans (later Homer's name for the mainland Mycenaean Greeks, some of whom were evidently resident on Crete), the 'blacks' (probably Nubian mercenaries), and the Danaids. For reasons unclear, Fischer locates these Danaids in Western Crete, though he relates them to the Danaids of later Greek legend, who were immigrants to Argos from Libya. Next come 'immigrants' from Libya and Put, the North African coastal region opposite Crete. And on the second side of the Disk, the Idaean lords are urged to hear the message: probably the local leaders of central Crete round Mount Ida, including Phaistos.

What is the message all these people are to listen to? It turns out that the Disk is a spoken recruiting poster, like the famous Kitchener one in Britain in 1914! The listeners are told that Hellas is in deadly danger- the first occurrence of this word in the whole Greek world. It is clear at this point in time (1600 BC) the Greeks of the mainland, Crete and the other islands were in full alliance. The danger is an invasion by the Carians of South-Western Asia Minor. All the peoples of Crete, residents and immigrants of all the ethnic groups mentioned, are summoned to rendezvous with the allied fleet at the island of Naxos.

As noted in the *ASCAP* article, the Disk is an incredibly early product of a printing process. Fischer reasonably supposes that a number of disks were printed with the message, to be read out by heralds in all the towns of the island, and the Phaistos one survived intact when it was baked in a conflagration.

As Fischer notes, a millenium later Thucydides reported that the Minoans drove the Carians from the Cyclades, so evidently the battle of Naxos was won, and the victory long remembered. The Disk thus records an event as memorable as the later Greek victory over the Persians at Salamis, the Dutch and English invasion of the Spanish invasion of England, or the Japanese defeat of the Mongol Armada.

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The following is reprinted from a "Letter to the Editor" by Claire Russell and W.M.S. Russell in *Folklore* 1971;82:317-318.

A Minoan Altar in Present Day Use?

On Wednesday 14th April 1971, two days before Good Friday according to the calendar of the Greek Orthodox Church, at about 3 p.m., we visited the so-called House of the High Priest, a few hundred yards from the Palace of Knossos in Crete. Built in mid-2nd millennium B.C., this house was partly excavated in 1931. Most of it lies underthe main road. The excavated part is set amongst small orchards and olive grooves. It contains a stone altar, 'set back behind a chancel-like structure', flanked by stands for Double Axes, and probably originally railed off by a metal grille.[1] When we arrived at the house, we saw on the altar a recently-picked carefully arranged bunch of flowers, including red poppies.

It is not unknown for flowers to replace bloodier offerings. In Mexico, Quetzalcoatl, who was believed to have prohibited human sacrifice, was worshipped with sacrifices of flowers, especially marigolds.[2]The altar in the Cretan 'High Priest's House' has a stone drain in front of it, which would have been convenient for blood as well as other liquid offerings. Poppies, on account of their colour, readily serve as a substitute for blood: this symbolism is evident in Britain every time Rembrance Day comes round in November.[3] In any case, poppies are known to have been sacred to the Cretan Great Goddess, for large figurines of her, found in a shrine at Gazi near Heraclion, are crowned with poppies.[4]

Many folk traditions persist for astonishingly long periods: for instance, an accurate tradition of a threefold coffin buried in a tumulus of the Late Bronze Age (about 1000 BC) at Seddin in Brandenburg.[5] Religious traditions are specially tenacious: the Mandaean silversmiths of modem Iraq still worship the sun-god Shamish, whose very name (the ancient Semetic Shamash) goes back to the 3rd millenium BC.[6, 7] There is a variety of evidence that Megalithic religious sites in Britain have retained their emotional importance for millennia.[8, 9, 10] There are even evidences that a tradition may return after long dormancy. At Bradwell-on-Sea, a ghostly horseman (elsewhere often associated with old sites) made his appearance only after the Saxon chapel, long used for secular purposes, was reconsecrated in 1920." [10]The excavation of a very ancient religious structure could, therefore, conceivably reawaken a very ancient tradition. It may be that Cretans are again using the altar in the 'High Priest's House' for devotion to a Goddess, at least to the Virgin Mary, who was known in parts of Cyprus, as recently as 1937, as 'Panayia Aphroditissa'.[12] Some Cretan traditions undoubtedly go back a long way. On Good Friday in Heraclion, we saw, hanging from the chandeliers in the churches, scarves arranged in the knotted loop pattern valued in Minoan religion, and ultimately derived from the religious imagery of Sumer.[13] The arrangement consists of a loop, a knot, and two hanging ends of unequal length; there is a beautiful Minoan model in faience, figured by Levy.[13]

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ARTICLE:

by Howard Bloom

Metaphor of the Automobile Clutch in Workings of Thalamus & Striatum

At the Annual Meeting of the Society of Neuro-sciences, Rodolfo Llinas suggested that thalamus is decoupled from striatum in depression and Parkinsons disease. According to the theory, the deep sadness in severe depression, the hand wringing in obsessive compulsive disorder, the ringing in the ears of tinnitus, the unrelenting discomfort of chronic pain and the shaking and immobility seen Parkinson's disease all stem from the same basic brain defect: a decoupling of two brain regions that normally fire their cells in synchrony.

Not only does this support the musical coordination of the brain as the method by which brain groupings bind, it supports another idea which has sprung from discussions with Neil Greenberg. Neil and I were talking at length about the striatum. A bit of further poking around gave me the impression that the striatum operates like the clutch in a stick shift car. For those who don't know how stick shifts operate, the auto's engine turns at a given speed. It rotates a plate which can be engaged or disengaged with a corresponding plate in the transmission. In an automobile one disengages the clutch, separating the spinning face plate from the engine with the receiving face plate of the transmission, so that one can change the transmission's gears without stripping them. Then one reengages the clutch and the two face plates once again make contact, allowing the engine to spin the transmission, which, like the central nervous system, then conveys the spinning motion to the auto's wheels. With the clutch disengaged, the engine can rev up all it wants, but the car won't budge.

I get the impression that in the same manner, the striatum couples input from the rest of the brain with the neurons which generate muscle operation and other forms of overt action. Dopamine seems to be a key. And that key operates in two ways. If we feel we have a sense of control, the ability of the mind to engage in action is enhanced. Our logical and emotional self-evaluation determines how much dopamine will spring forth to engage the striatal clutch and allow us to turn ourthoughts into overt behavior. If we feel out of control, the amount of dopamine will decrease, leaving us a good deal more inert, no matter what our notions of useful activity may be. Low levels of dopamine mean that the mind has a much hardertime getting the body to move. This is a form of sluggishness which I suspect all of us have experienced in moments of depression or defeat.

Dopamine-imitating chemicals like those in cocaine can artificially increase the engagement of the striatal clutch and send even depressed folks into a flurry of energized activity. Then the coke or amphetamine wears off and the clutch disengages again, leaving someone whose life is still wobbling out of control bereft of the ability to do more than call his local dealer and request some more cocaine.

Give a beast a sense of greater control, and the dopamine level in the striatum goes up, allowing the creature to build on its action with yet more action. This would help explain why, in certain experiments, rats tossed into a cage with another rat of the same sex cowered helplessly ifthey'd been beaten in previous fights. However if the experimenters rigged the battle so that the losing rat won, that win would pep the former winless wonder up, give him courage, and help him win his next battle.

Lose and the dopamine/striatum clutch disengages. Win and it couples the mind with the body and readies it for heroic deeds. (This, by the way, is one of the mechanisms by which the "inner-judges" of the complex adaptive system quintet—conformity enforcers, diversity generators, inner-judges, resource shifters, and intergroup tournaments, operates. Assuming that the summary I've just given relates at all to reality, that is.) Now the question is this. Is the thalamic clutch to which this study alludes the same as the striatal clutch, and if not, do we then have two clutches—or perhaps more—engaging and disengaging our power to act?

ARTICLE:

by Russell Gardner, Jr.

Do Effects of Omega-3 Fatty Acids Challenge the Social Rank Theory of Depression?

This past summer I attended an interesting session on diet and psychiatric problems at The Congress of the World Psychiatric Association in Hamburg, Germany. Many now documented psychiatric and other health benefits stem from eating omega-3 fatty acids found in fatty fish like tuna, salmon and mackeral, walnuts, flaxseed, brazil nuts, canola oil and leafy green vegetables, their absorption enhanced by eating olive oil. Before I retired, I'd heard something similar at a Grand Rounds at University of Texas Medical Branch in Galveston from preliminary research on fish meal diet as therapy for manic patients. But generally I ignore any such new developments if they seem at all faddish, assuming that if I became ill I would then necessarily use the unpleasant low fat high carbohydrate diet of Dean Omish. And though interested in evolutionary biology and its implications for psychiatry, the "paleolithic diet" hadn't before penetrated my awareness, although we recall John Pearce's account of his experience with the use of the Atkins high protein diet that melted his abdominal size. He conjectured it turned down the gain on his appetite from hunter-gatherer adaptations. Proteins reducing appetite might have been adaptive for ancient hunters gorging on their kill just as carbohydrates enhancing appetite would have been helpful for the gatherers going for ever more tubers.

But the Hamburg results featuring depression and schizophrenia showed that if omega-3 fatty acids weren't a food they would be a powerful new psycho-tropic drug applicable to psychiatric maladies from schizophrenia to depression to ADHD. There was a fifty fold lesser amounts of depression in countries where the citizens ate fish as a matter of course. This work was initially done by a group led by Ansell Keyes from the University of Minnesota, as pointed out to me by Carolyn Reichelt, who was a research assistant to Dr. Keyes.

The effects involve considerably more than psychiatric medicine as I discovered with Artemis P. Simopoulos's book co-authored with nutrition writer, Jo Davidson, *The Omega Plan: The Medically Proven Diet That Restores Your Body's Essential Nutritional Balance.* Omega-3 fatty acids give rise to linolenic acid (LNA). LNA-derivatives hold importance in cell membranes, notably neurons. Omega-6 fatty acids (comparatively "bad" fats) give rise to linoleic acid (LA) and predominate in what we usually eat while the omega-3s are generally absent or neglible. Rats fed diets similarly rich in omega-6 fatty acids develop obesity and insulin resistance, two common U.S. human afflictions. So the U.S. population exemplifies a huge human experiment, and Israel even more so. Israelites have more obesity and diabetes than do Americans though they eat fewer calories and less fat. But they consume more LA than any other population in the world, 8% more than in the U.S.

The book's first author, Dr. Simopoulos, was originally from Greece. Currently she is president for The Center for Genetics, Nutrition, and Health located in Washington, D.C. She headed the Nutrition Coordinating Committee of the NIH for nine years and has been nutritional advisor to the Office of Consumer Affairs at the White House. Her co-author has helped other authorities write nine previous books on diet or psychological topics. I read it and was impressed, so was sorry to see it remaindered though I appreciated the $5 cost. Going via the web to Amazon.com to determine availability, I could not find the hardcover version. But the paperback version subtitled *The Lifesaving Nutritional Program Based on the Diet of the Island of Crete* lists at $11.20.[1]

The Cretans, it turned out, were healthiest of many national groups in a series of comparisons made in the 1970s, including the mainland Greeks. Fifty-fold differences in depression, for instance, depended on

whether the diet was prominantly fish. And in the subsequent decades of research, other "diseases of civilization" have shown similar differences, including heart disease, cancer, obesity, inflammatory disease, autoimmune disease, allergies, diabetes, and depression. These are all worsened with diets of omega-6s unbalanced with omega-3s. Simopoulos recommends adopting a new diet similar to what the Cretans eat and what our ancestors ate in paleolithic times, before domesticated animals and grain became hallmarks of modem development. And this new/old diet does not entail the draconian cuts in fat that Dean Ornish, modem investigator of the Pritikin diet, recommends. Rather Simopoulos in her Omega plan suggests *"allowing you to eat from 30-35% of one's daily diet as fats — absolutely free of guilt!"* (italics in the original).

Specifically, regarding heart disease amelioration, the Lyon study of patients post-myocardial infarct elicited as subjects 302 people who had had a heart attack; one half randomly assigned a modified American Heart Association diet with 30% fat with the other half eating the Cretan diet with olive and canola oils as the only dietary lipids and higher amounts of fish, grains, fruits and vegetables. At the four month point the group eating the Cretan diet had significantly less mortality, showing a difference sooner than any other diet or medication. There were 76% few deaths in the Cretan diet group; therefore, at two years the AHA diet had to be discontinued as it would have been unethical.

The Omega Plan features the following seven points:

1. Eat foods rich in omega-3 fatty acids such as fatty fish (salmon, tuna, halibut, lake trout, herring, mackerel), walnuts, canola oil, flaxseeds, and green leafy vegetables. Or, if you prefer, take omega-3 supplements, usually fish or flaxseed meal.

2. Use monosaturated oils such as olive oil and canola oil as the household's primary fat.

3. Eat seven or more servings of fruits and vegetable everyday.

4. Eat more vegetable protein, including peas, beans, and nuts.

5. Avoid saturated fat by choosing lean over fatty meat (if one eats meat) and low-fat overfull-fat milk products.

6. Avoid oils that are high in omega-6 fatty acids, including com, safflower, sunflower, soybean and cottonseed oils.

7. Reduce intake of trans-fatty acids by cutting back on margarine, vegetable shortening, commercial pastries, deep-fat fried food, and most prepared snacks, mixes and convenience food.

Regarding psychiatric disorders, at Hamburg I heard Joseph Hebbeln from the NIAAA present some results that I noted there. First in the across-national survey of 165,000 people, a 50-fold prevalence difference in depression depended on annual fish consumption. One fishing village never had a case of depression in its known history with no cases whatsoever of suicide. Hebbeln reported in *Lancet* in 1998 that the statistics for fish consumption and post-partum depression feature the powerful negative correlation of 0.75 with over 50% of the variance accounted for by fish-eating. Animal work with primatologist Steve Suomi showed that developing animals are boosted in their development by eating increased amounts of omega-3s.

Moreover, there are effects on hostility. Hebbeln and Salem have suggested the famous vulnerability to heart disease of TypeA people (remember they are hostile and aggressive) may stem from omega-3 deficiency as heart disease, hostility and depression all correlate with that common factor. Others speakers in Hamburg showed that the positive symptoms of schizophrenia and tardive dyskinesia are improved by the use of omega-3 enhanced diets. Moreover, in animal models, learning and motor control were enhanced by this diet modification. In summary, the question posed at the conference, "Is eating fish like taking a psychotropic drug?" had the clear answer of "Yes" for the presenters.

Now my reason for bringing these findings to the attention of ASCAP readers concerns how what one

eats dovetails with, or contradicts, the behavioral pattern of depressed individuals who take on a low profile, are self-abasing, profess pessimism and despair, are overly submissive to those higher in the heirarchy. This happens with such power that they even commit suicide after reverses in fortunes. Paul Watson and Paul Andrews discuss the more cortical level kinds of calculations of extortion of significant others to give more to the afflicted person. This doesn't account for the likely ancient roots of submission and defeat, but the cortex is often in the service of more ancient motivations. Does the idea that depression seems to be prevented or treated with omega-3 fatty acids combat the idea that the condition is a function of agonistic and social rank related behaviors?

Some may feel that a diet affecting the clinical picture indicate that depression is a metabolic condition with nothing to do with interpersonal life. This resembles the idea that depression is chemical because it responds to chemicals we call antidepressants. And of course it *is* chemical, just as all our bodies are chemical *and* organic *and* breathing behaving organisms and family members *and* members of large human groupings. We are multileveled systems and glory in this; simplifying a causal agent to one level may heuristically work but not always, though it would be simpler for those manufacturing drugs and other simple remedies for reality to be so.

Actually such facts help with the multilevel analysis that must be done for an ultimate sociophysiological analysis that is needed for a more adequate basic science framework for the medical specialty of psychiatry, that has yet to aspire to the pathophysi-ological formulations of other specialities. Other factors include the nature of important receptors that vary with allelic inheritance. For instance, a shorter serotonin receptor may bias the individual towards a vulnerability to alcoholism.[2]

But returning to the issue of omega-3 fatty acids (versus omega-6s) involves asking what does having more omega-3 fatty acids do that ameliorates all these conditions? It gives rise to linolenic fatty acid and this in turn seems to be used by cell membranes. There seems to be a membrane stabilizing effect. We know that membrane stabilizers such as valproate and carbamazepine have beneficial effects in bipolar disorders. Recall that, although final results are not yet in, the first I learned of the omega-3 fatty acid benefits involved their use in the treatment of mania.

In conclusion, eating flaxseed, fatty fish, and leafy green vegetables may allow you to live longer and also to live joyfully that longer time you have on earth. Membrane stabilization may allow the person to be more in charge of her or his life.

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ARTICLE :

by Valerie Yule

The Wastage of Human Potential

This overview of the challenge of waste of intelligence will hopefully and usefully act as a background for more specialised studies and to awaken the general public to awareness of the extent of problems of waste of human resources and quality of life, which once identified point to their own solutions. The perspective is that of a former clinical child psychologist and school psychologist who lived and worked mainly in disadvantaged areas. She is primarily concerned with applied psychology in the community.

Alone among animals in their natural environment, human beings do not operate at the ceiling of their potential intelligence, defining intelligence as the ability to work out how to respond in a situation requiring more than instinct-driven or imprinted behaviour. Laboratory and zoo studies of animals under deprived, stressed, or crowded conditions or given abnormal early experiences replicate too often how human beings behave in 'civilised' society. People are wasted as much as all our other natural resources. Much of this waste is waste of lives and of health - we are aware of that. Waste of intelligence is little considered - yet it reduces human capacity to solve the other problems. This is a matter for science and for politics; and educators given the brief to promote intelligence must be concerned about what goes on outside schools as well as in them.

'Intelligence' is still, after a century of research, a hot topic for international conferences and academic projects and public controversy. The three major issues presently remain old topics such as (1) whetherthere are innate differences of race or gender that may be unalterable - the most pessimistic in the past decade being Hernstein & Murray in their *The Bell Curve.*[1] (2) Investigators remain concerned about definitions, theory, assessment and improvements in functioning intelligence through formal schooling. Rowe[2] and Detterman & Sternberg[3] have written on this. (3) A newer issue features newer interests in artificial intelligence that may complement or even overtake human mental processing.[1] Yet the most effective and inexpensive way to raise the natural resource of human intelligence would be to prevent its waste, while recognising that for more than fifty years, dedicated and often large-scale educational programs, mostly unsuccessful in the long run, have attempted to raise the IQs of the socially disadvantaged.

Attempts to measure intelligence depend upon its definition. It is now generally recognised that the 'intelligence quotient', IQ, the most useful objective measure so far, still does not account for more than half of even academic intellectual success - curiosity and persistence cannot be tied down and quantified in standardised tests. The definition I would use is that intelligence is the 'ability to work out what to do in a situation'. This includes but is not restricted to the ability to work out what to do in an intelligence test. This intelligence cannot be precisely scaled, but it can be observed.

Current waste of natural resources makes up a high proportion of all production. Waste is estimated to be up to 25% for energy sources alone - and the most effective immediate way to increase the available natural resources in the world as shortages increase, is to reduce this wastage. Reducing waste is also the most obvious way of raising human intelligence, since there may be genetic ceilings to individual potential. There is still unsettled controversy over whether important aspects of measured intelligence are declining or improving in the West. Arguments have hardly advanced beyond Cattell in 1983 as seen in the *Scientific American Presents* special issue on Exploring Intelligence in 1998.[1] But the continuing waste is obvious as soon as one looks. The problem of waste of intelligence is growing world-wide. It is only partially stemmed by extending formal education, yet the problem can be tackled, and the solutions themselves require intelligence rather than money.

Traditional concerns about intelligence have often had elitist, snobbish and even racist features. Nineteenth-century eugenicists worried about declining national intelligence through disproportionate reproduction of the 'unfit'. In our present society there is also a good deal of effort put into identifying and encouraging 'gifted' children, to lift them out of the rut. This has aroused a gut reaction among many liberal and egalitarian people that concern to improve intelligence is not politically correct. Working-class reaction may be suspicion that capitalists support schooling in order to have a more intelligent but still docile workforce. Some pundits assert that future economic forces will ensure that only a minority can or need develop their creative potential, so that there is no need to be worried about waste of intelligence in the general public. Those already privileged in a pyramidical ordering of society may have self-interest as a motive to want to discourage competition. They may worry about a shortage of menial labor if everyone was as bright as they could be.

There is also the reservation that intelligence directed to private profit without moral development can result in more clever criminals and worse oppressions. An inner suburban headmaster said about educating the local youth - 'It only makes them harder to catch', and prison officials are often unenthusiastic about literacy programs within prisons for the same reason.

But such problems could be solved by wisdom and not by preferring stupidity. More intelligence is needed, not less, because we are surrounded by increasingly complex problems that require intelligent solutions and long-term rather than short-term thinking. The 'ability to work out what to do in a situation' is about the best hope that all of us have, collectively, to survive. And, for each individual person there is the personal value that nobody can fulfil their own potential if their brain is stunted. Social justice requires prevention of environmental handicaps, because waste of intelligence means waste of human lives. An intelligent democracy may be able to train and vote for more intelligent governments, to think of better solutions for our social, political, and economic problems, and bring in reforms through non-destructive methods. Socially divisive astronomical pay need not be justified for the thousand top business jobs in the country on the grounds that headhunters profess difficulty in finding sufficiently able people to fill them in a population of eighteen million.

Intelligence defined indicates the ability to work out what to do in a situation' means problem-solving in the real world. Its components include the abilities that standard intelligence tests try to measure - practical and verbal reasoning, comprehension and judgement of situations, speed of mental operations, memory, vocabulary and range of concepts, ability to learn (which includes curiosity), awareness and attention to detail, attention span and persistence, abstraction, analysis and synthesis, sequencing and range of concepts - all of which can be affected in functioning by life experiences. In everyday life, intelligence involves more than the speed with which information travels through the nervous system. That is only part of the story. This basic neuropsychological potential is augmented from experience, with the accumulation of knowledge, reflection and understanding -that is, increasing wisdom. The early indicators of intelligence, not always observable in the situation of standard intelligence testing , are curiosity, organised memory and persistence, and they are also vulnerable to experiences in life.

Whatever an individual's genetic ceiling for facility of mental operations, there are two sources of serious waste. Young people may get high scores in intelligence tests, but fail to apply their intelligence in their studies or everyday life. The far greater source of under-achievement, however, is when intellectual functioning itself is lower than it might be.

The greatest waste of resources of intelligence throughout history has been through caste systems which ensured servility of the masses and the subservience of women. Famine, disease and war reduce lives to struggles for survival, with no chance to develop any powers of the conscious mind. Malnutrition and famine stunt children's developing powers and sap mental energy, so that lack of educational opportunities can be almost immaterial, because the pupils could hardly benefit. Impoverished and famine-threatened populations that are increasing in the world

are a hazard to both East and West, since mental inability to tackle their problems constructively increases the menace. Much malnutrition is not the result of famine as such, and could be prevented. For example, Robert Buist of the *International Clinical Nutrition Review* described IQ improvements of up to 30 points when malnourished children received iron supplements; and this was attributed to the need for iron for left brain development and the ability to attend intellectually. Over 3% of a sample of Australian children had been found iron-deficient without manifesting anemic symptoms, yet this could be remedied by sufficient iron-rich foods such as fish, eggs, and beans. Multivitamin supplements may also improve the intellectual development of junk-fed children.

Physical and environmental hazards that affect intelligence

Prenatal. Some major problems of congenital mental handicap and brain-damage before or after birth still remain unsolved by progress in medical knowledge, although we now achieve higher survival rates. However, it is now not realised how much the unborn foetus may be affected by environmental pollutions and risks, which can include the mother's own medications, risk-laden behaviour or responses to stress. The sophistication and cost of modem intensive medical care for premature and handicapped babies contrast, shockingly, with our social tolerance of factors that increase the incidence of such births.

Insults to the brain. Popular concern forthe physical health of the body is increasing and it fills magazines and makes headlines. But concern still tends to exclude the physical well-being of the brain itself. Most people know that deliberate battering can cause permanent brain-damage in children, but surprisingly few are aware that significant though perhaps less immediately obvious harm to mental functioning can result from shaking babies or boxing ears. What research is there concerns children's cognitive functioning after they have had prolonged exposure as infants to very noisy and chaotic surroundings? There should be follow-up of the infants who are rattled over uneven streets in some types of cheap baby-strollers in the first weeks of life - Ithough this is more a potential risk in Britain than in Australia.

If everyone was more aware of the miracle of construction that is within every human being, they might temper the casual violence that is committed against our brains - in themselves and others. Everyone should know more about their own brains. The physical processes of the brain and the thinking processes of the mind are amazing, and how they link is an extraordinary mystery. Death tolls in accidents make headlines, but physical brain damage is far worse in its long-term consequences for the living -for the victims, the carers and society. Yet the community acquiesces in the brain damage that results from needless road and industrial accidents and from head injuries in unnecessarily aggressive sports. It should not be socially-induced and socially-acceptable to be "mind-shattered," "zonked," "stoned," "blind drunk," "out of one's mind," or "brain-bombed." There is currently too much vocabulary about 'blowing one's brains' and similar words that describe as desirable the intentional loss of control of mental faculties. Full development of our conscious awareness reveals more wonders, and expands minds far more than any ingested chemical compounds. It seems to me hazardous to referto recreational "use" as well as "abuse" of soft drugs that "only affect the higher nervous systems of the brain," and "may trigger schizophrenia and cause car accidents," when the residual effects for casual users may be reduction in the energy and motivation to think, and often reduced ability to do so.

The need for adventure which appears normal for adolescent males requires more constructive opportunities in our society, because adolescents and young adults can take on the risk of permanent brain injury as a challenge, even of a suicidal kind. They need to have other cultural means to demonstrate their youthful heroism and daring. A most urgent direction that should be offered young males is to demonstrate their courage in the courage to resist commercial pushers and social pressures. Drug-taking, bombing out, shooting up, glue-sniffing and "speed to death" can all betaken on out of desire for adventure, or depression, or anti-authoritarianism or peer pressure. Young people can be easily affected by social pessimism around them and by the prospects of annihila-

tion that are continually purveyed about any number of possible environmental, social and political disasters, unless they also have adult encouragement to rise to these challenges. Chaos and disruption in home lives and meaninglessness in the messages that bombard them from television and other entertainment increase disrespect and ignorance about the pleasures of thinking and reflection.

Excessive bouts of intoxication through drugs or drinking can cause permanent brain damage but there are still unanswered questions about what minimal but equally permanent lessening of intellectual capacity and mental energy may be caused by chronic though less spectacular heavy drinking. It is only now that advertising and social influence are beginning to try to promote appreciation of alcohol for pleasure rather than to intoxicate, lose inhibitions, blur consciousness or macho show off.

Cannabis is promoted as harmless because it "only affects the highest centres of the brain" but these may be the most delicate and vulnerable as well as the most precious of our neural equipment, and the effects may be more difficult to assess, since they appear more in the quality of daily thought, work, speech and motivation than in scores on blunt-edged tests.

Some psychedelic drugs are taken with a dose of risk in rave-scenes, since only a few takers may become temporarily or long-term psychotic. Ecstasy for example has been known to reduce contact between nerve cells in the brain through damage to their axons, but it has only recently been found by scientists at John Hopkins University that regrowth is liable to be abnormal. Now that long-term follow-ups of LSD users are possible, it appears that all do not remain as unfazed as Timothy Leary.

Individual humans must be considered innocent until proven guilty. However, it is the opposite with foods and medicines, which the law insists must face tests to prove that they are safe. But some other innovations to our society may be so dangerous to mental functioning that it is surprising that they are not also legally regarded as potentially dangerous, with research urgently required to see whetherthey can be declared innocent.

Residual deafness can result from overioud music that relies for its effect on decibels not melody, and epileptic attacks can be triggered by flashing lights and some television pyrotechnics. We know this. But we do not know about their other possible effects, in blunting the agility and sensitivity of mental processes, or in simply numbing them so that increasing physical sensation is sought and mental effort avoided. It has been claimed that research has shown that listening to Mozart et al raises the IQ for another fifteen minutes; what does listening to heavy metal do for mental processes similarly tested? Sony Walkmen, disco noise and psychodelic lighting effects all need more careful evaluation for long-term psycho-neural effects on habitues.

MTV (fastmoving visual collages to promote rock and pop) is possibly even more dangerous, particularly but not only for youth, because its techniques are used so constantly in mass-audience television, so that even ABC-viewers cannot avoid frequent exposure. In this so-called 'visual poetry', sequential meaning is lacking and hundreds of often unconnected visual images per second flash on the screen. It is claimed that youth has developed the mental ability to process this chaotic visual information, but there is no evidence for this. It may be more likely that young people are fascinated by its hypnotic quality, much as humans have always stared into the flames of firelight since the primal cave - but there is a qualitative difference, and parahallucinations on screen may be a softener-up for addiction to drug-induced hallucinations which can be similar. Where is the research that is needed?

Child development. Children's intelligence may be stunted when adults regard child-care as merely physical, wiping noses and bottoms, a menial activity that rots the brains of adult care-givers, instead of stimulating adult intelligence, as real personal interaction with children always does. Michael Rutter has summarised the cumulative findings of research on family and school influences on cognitive development.[5] These findings help to explain why IQ scores may not be matched by intelligent behavior, scholastic attainment or adult achievement. Some features of

home environments appear to help the development of children's intelligence towards their full potential. Songs, stories, lullabies, and a place in adult conversations or company promote young children's abilities to develop their language, knowledge, understanding and curiosity-that is, their vital verbal intelligence. (See for example, the research of Barbara Tizard, John Tizard and John Raven.) [7] Other environmental experiences in home and community are known to produce a high proportion of disturbed and disturbing children, and to change and prevent these would be more effective than our more expensive policies of focussing on ambulance-style clinic and remedial services too late. Day-centres for socially disadvantaged children should be places where children can be compensated by having close and secure relationships with adults who do not betray them by high staff-turnover, and where they are introduced to constructive and literate interests as pleasures. Often they can be more like pleasant left-luggage centres, and children may receive meaningless over-stimulation but limited opportunities to develop intelligence, concentration and constructive achievement that requires time and application.

The suffering experienced by children in disturbed or violent homes can produce emotional disturbances and behaviour disorders without affecting IQ itself, but the results can be disturbed and misbehaving children who cannot apply their abilities nor benefit property from their educational opportunities, and so their future intellectual development is stunted. The rare and occasional child may compensate by becoming a great achiever, but it is only the very few who survive like that. Now that there is more interest in these 'survivors', and how they manage to achieve in spite of damaging circumstances, it may become possible for more of the others to be rescued too.

Children can be labelled with hyperactivity, impulse-discharge disorder and attention-deficit, if they seem unable to settle down to any constructive play or learning. There may be constitutional factors of temperament and personality, but there are unsettled controversies about the possible contribution of other factors as triggers, causes or exacerbations - for example, the possible physical effects of pollutants such as lead or food colourings, the psychological effects of the anxiety children may suffer in disturbed homes, or even the results of parents' ignorance of management skills, which they could have learnt. Measured IQ as such may not appear to be affected except in some subskills, but it is a wasted intelligence that they have, since they cannot apply it to sustained learning or constructive actions.

Family environment is important in developing language abilities - which are important for effective intelligence as well as measured IQ. Deprived and disturbed families can produce children so emotionally and behaviourally disturbed that they cannot learn or are fearful of doing so.

it is not politically correct, but more attention needs to be paid to whether many of the children of poor and disadvantaged single parents may be in the long run unable to get out of a trap of disadvantage and failure through education or applied intelligence. Single parents who are not poor or disadvantaged themselves can be hostile to evidence that others may be struggling ineffectively with lack of resources. It is possible that the prevalence of black single-parenthood burdened by poverty is an important factor in the failure of young black males, because they do not have role models of adequate men in their lives. This can suggest serious implications for the consequences of our own changing family patterns. (The misogyny in black gangsta rap may also be attributable at least in part to the problems of mother-son relationships when the single mother is harassed and unsupported and adult males set an example of contempt and exploitation of females.)

Personal experiences and observations bring research findings to life. They illustrate that while heredity may set the ceiling for intelligence, how much environment can affect whether that potential is reached, and how it is manifested. A holiday boy from an orphanage used to arrive with us barely interested in books, and leave a month later reading avidly - only to come down for the next holiday almost ex-literate again. Adopted children's intellectual achievements tend to appear half-way between those of their adopted and natural families. In 1970 I made an unpublished study of the

reliability overtime of children's IQ assessments at the Royal Melbourne Children's Hospital. In a series of ninety-two children who were reviewed over a period, eighteen had IQ scores which had varied more than one standard deviation from their previous assessments.

Significant reasons were found for this variability when their original full clinical assessments were then re-examined. The hospital psychologists had routinely provided recommendations and warnings in their conclusions to these assessments, and for fourteen of these eighteen cases, it turned out that it had made a critical difference to whether these children's tested IQ had improved or deteriorated, according to whether these recommendations had been taken up or the warnings had been fulfilled. Two children suffered from deteriorating medical disorders, and there was reason to think that two others may not have had a reliable initial assessment, but for the remaining fourteen, it had been critical for their future whether there were changes or interventions in their lives - or failure to change or intervene.

The effect of social environment on intellectual development also appeared significant in an unpublished 1974 comparison of inner urban (Fitzroy, Melbourne, Australia) and middle-class school-children (Box Hill) on two measures of intelligence, the Peabody Picture Vocabulary Test as a verbal test, and the non-verbal Goodenough-Harris Draw a Person Test. The inner-urban school beginners, aged four to five, scored as well as the suburban Box Hill children in drawing a person, but they had significantly lower scores on the vocabulary test. By the end of primary school, however, at year6, the vocabulary of inner urban children aged ten to twelve showed an even greater lag behind that of the suburban children, and their drawing too was also poorer than the suburban children's. On the other hand, in a nearby school, also socially disadvan-taged, the Draw-a-Person pictures of a class of ten-year-olds were almost uniformly remarkably good and remarkably varied, better as a class than any I have seen, and this was clearly due to the teaching and influence of an excellent classroom teacher, who was not even an artist herself. This suggested - although it did not prove - that for children in the first Fftzroy school the inner-urban environment had been insufficiently stimulating for development as measured by these two tests. This conclusion was supported by a colleague who had also compared the achievements of two groups of immigrant Greek children with working-class parents. Their families had moved into similar low-cost housing areas, but one area was in the inner-suburbs and one in a relatively poor pocket of a middle-class suburb. It appeared to be fortuitous which housing the families had found. Academic achievements were significantly higher for the Greek children who were educated in the middle-class suburban schools. That is, they had more chance to realise the potential that they had.

In working-class areas where families have been losing hope, there may be high general hostility to education, which is perceived as imposed upon them to produce "factory-fodder." This attitude is taken up by children and youth in the schools, and so they may unwittingly spoil their own opportunities. The intelligent child at school may have to act dumb in order to survive. I was quite often called in as a school psychologist to see apparently dull disruptive children who were actually bright, and whose basic problem was that they had to keep their minds and heads low to avoid being bashed up by their mates or even being disliked as saucy or deep by their teachers.

The failure of most Head Start programs in the United States may have been partly because they were not the right sort of programs, but a major reason was probably that they could not tackle the basic sources of continuing intellectual deprivation in their home environment and schooling, rather than failure simply because children were bom into the social orders they deserved. Reporting of findings in terms of group scores may also have left unidentified those children who did have the genetic capacity to take advantage of the improved opportunities.

Good schooling is still a matter of luck for most children, regardless of what type of school they attend, as Barbara Tizard found in 1988, and others have shown in research demonstrating how much children's academic futures can be affected by the quality of the individual teachers in their very first school year. Far

greater value and status should be given to Infant teachers, and more emphasis on practical training of teachers in how to teach, and in public speaking.

Educators may under-value the need to acquire accumulated and automated knowledge as a base for higher-orderthinking. Current trends in schooling devalue "knowledge" into useless "isolated facts" and "trivial pursuits." Schools could avoid time-wasting 'activities 'and 'busywork' that lead nowhere, prevent adults providing models of fear of print or 'hard thinking', cut emphasis on what is useless and expensive and in training children to be fiction writers but little else. Imagination should not be seen as limited to fantasy worlds of whimsy and not to the possibilities of the real world. Children should not be deliberately refused access to long term goals or to knowledge of what is ahead of them in case they learn it too early. They should have continual access to revision of what they are supposed to have learned, in order to organize it in memory.

There is also a great waste of technologically-directed intelligence because so few children have workshop opportunities at home or school to "think with their hands." The regulation class-room set-up of teaching is good for some sorts of learning - it is hopeless for others. What can be efficiently taught in classes of 500, or in individual apprentice-style, is not economically taught in regulation Procrustean classes of 25.

Distinctions should be made. The Victorian Certificate of Education has had a recent emphasis on presentation of work in 'common assessment tasks' which has risked training pupils mostly in how to present an image, while teachers are reduced in effectiveness by exhaustion fulfilling the administrative tasks of running the program. I am glad that my own final school years were times of enjoyment of learning and many interests, that only had to be paid for by the great sporting event of the exams at the end.

Some educational philosophies may be sufficiently enlightened to 'start where the children are' but may then simply leave them there. Waste results from believing the fallacy that learning by discovering means pupils must learn without help - rediscovering all wheels themselves and repeating the same mistakes, instead of discovering what adults can teach them directly as well. A generation that does not know the achievements of the past cannot stand on its shoulders to reach still further.

The 'Message of the Book' in what students are given to read at school also needs careful attention. What messages about what the world is like and how to behave in it do adolescents pick up from the novels and plays set them in their English classes - ? Messages of cynicism and helplessness? Models of losers, victims, callous winners? It is better not to think?

The Education of the People

The education that is effective today is by television. Yet the models shown on TV teach destruction, consumption, and intelligence that is directed to criminal activities. A summary of the intellectual content of peak viewing times of the five Melbourne television channels over several consecutive weeks showed practically no opportunity for adults or teenagers to use television as an self-educational medium.

Desire to find meaning has been considered a fundamental human characteristic, and is essential for intelligent operations. But many children seem unable to read for meaning, orto put mental effort into understanding school learning, or to seek purposes for their lives as they grow older. Some contributing factors may be original experiences of meaninglessness in chaotic, disturbed family life, and long-time childhood exposure to confusing, unexplained television.

Much film drama now consists of action without explanation - only the sophisticated may be able to work out inferences sometimes. What happens to children habituated to television that is sensation but not meaning - do they risk losing the ability or desire to search for meaning and to reflect thoughtfully on events? Studies of middle-class children's comprehension are reassuring - but after all, they usually do get some of the parental guidance that is requested, and early meaningful and consistent relationships and home life. But how are disadvantaged children to learn

to process television or any other sort of information -and what do they do with it in building up their 'Piagetian schemata' about the world and the processes of cause and effect?

Yet television and video could demonstrate brilliant teaching. It is already used for teaching technological skills and Do-It-Yourself. It could be used for advance-organizers and for summarising and reviewing curriculum, and for training in social skills. We need a whole Channel for Open Primary School, Open Secondary School, Open Technical School, on at prime times, ratherthan during school hours, for everyone to have the opportunity to benefit, with more complete courses on video. We are utterly wasting the possibilities of television for public education -which had been thought, sixty years ago, to offer the possibility of civilising the whole world. From television, including soaps, could be learnt models of intelligent problem solving, and values placed on knowledge, enterprise and constructive achievement, just as soaps are now being used in Africa to teach women everyday skills and healthcare.

Literacy

Video and CDI could be used to Teach Yourself to Read, starting from scratch, which one-off television cannot do at all well. Improvements in the English writing system are also required, since once literacy is acquired, the opportunities for development of intelligence become almost unlimited. It should be axiomatic that modem forms of information technology, including one of the oldest, the spelling system, must be user-friendly, designed to suit the needs and capabilities of humans, to increase their effective intelligence. Now the same degree of human engineering and 'user-friendliness' is also needed for the oldest form of information technology, our ancient writing system, so that print literacy can be more easily and universally accessed. Electronic media can complement, but not substitute for, the world of books, which act like external minds.

Cultural factors can waste our resources of intelligence. There may be a form of mental energy or even elan vitale that is apparent in active intelligence. Thinking is hard work and some people enjoy that hard sport more than others. Other could learn to enjoy it more. Cultures vary in how much they encourage and respect intelligence. Do brains 'rust'? Is there any cause and effect in the fact that people who continue to think actively get senile less quickly? Is the average mental age of the population only about fourteen because they give their mental faculties insufficient exercise? How can intelligence become popularly rated as socially valuable, so that ordinary people enjoy operating at the top end of their intelligence, whatever it may be? Children are trained to direct their intelligence according to their culture - as in the contrast between aboriginal and white, and in the subcultures of which weary teachers have said, 'What they lack in intelligence they make up for in low cunning'. However, can a culture not train children to direct their intelligence anywhere, but just let it atrophy?

Intelligence can be devalued in the name of democracy - that everybody should be equal in ability and outcomes as well as in opportunities. But the survival of democracy depends upon each person being as intelligent as is individually possible for each one. Intelligent people who can use their talents to serve their community in useful occupations should arouse popular delight rather than envy.

A modem belief is that Reason is to blame for the present state of the world, and that peace can only come by listening to the heart. Certainly reason can be used for evil as well as good, when intelligence is focussed on selfish short-term or too limited aims, and produces instruments of destruction. But the greater danger is access by men of passion and impulse and ignorance to the megakill inventions of men of too-focussed intelligence. Someone who operates mainly on feelings is not a full human being any more than a completely intellectualising person.

Waste of people.

We rely on the intelligence of a minority to run our complex technological society, and this intelligence is too specialised. Most of us remain too stupid and short-sighted in our everyday life, and our social

problems are not tackled as effectively as the technological ones. Perhaps female intelligence has yet to get operating in this human field, as male intelligence has concentrated on machines and power systems (my preferred feminist theory). It is not, as some claim, 'inevitable human nature' that we have too ready a resort to destructive, short term solutions of problems, conformity to prejudices, paralysed morale and a rigid limitation of the areas of life in which intelligence may be displayed. Jonathan Swift would still be aroused to savage indignation by our social irrationality. The deficiencies of intelligent application can be seen in consumer behaviour, the pitch of mass advertising and entertainment, responses to known health hazards, the high proportion of school failers and adult non-copers of average intelligence, and fatalistic resignation to situations that should be intolerable. 'Psychological poverty' which is increased by economic poverty is not necessarily prevented by affluence, because it includes inability to apply intelligence constructively to problems of life in any condition.

The possession of intelligence is not enough if it is only focussed on trivia or personal self-interest. MENSA has not helped to save the world. The 'intelligentsia' can be self-centred, keeping its art, literature and philosophy incommunicable to the public. They can fritter their intelligence. Even in academia there can be rigid limitations of when intelligent behavior is acceptable - as the history of the 'intelligentsia' can show, with its periods of desiccation in pedantic scholasticism, classicism or measurement of scholarship primarily by quantity or minutiae of presentation, not by worth of content.

Stupidity results in people who are less healthy, competent, fulfilled and successful than they might be. It does not follow that being more intelligent would make them happier of course. It was an ancient Greek who said, The truly rational man would commit suicide' and we still cannot bear to face too much reality. Nevertheless, thinking is a better alternative to boredom, offering pleasure as well as pain. Thinking can be avoided because it is hard work, experienced as hard - but it can be experienced as a form of hard play, and a vigorous sport that is free for all. People as well as their intelligence are wasted when with time on their hands - for example, through unemployment or illness - they are expected to rot mentally.

The problems of the world are so great and universally threatening that many try to escape awareness by shutting off their minds or numbing them. Yet intelligence should be considered a more vital resource even than money. This is a social situation where some things cannot wait until we know everything there is to know.

Shortage of intelligence.

It is absurd that we should accept that in nations of millions of people, natural talent is so thin on the ground that astronomical salary differentials are required, and that two people short of ideas can monopolise media attention as the only possible leaders for Australia. What may be making so many of our Miltons so mute and Edisons so rare? Money was not the reason why poverty-stricken Lowland Scotland contributed so much to the building of the modem world, and it may not be the main reason why that region is in the doldrums now. Some believe money solves all problems, and many believe that violence is the best means to obtain money or power. But an overview of cultures and civilisations shows how important brain-power has been as a major resource for any country, however rich or poor.

There is little point in debating whether 'national intelligence' is rising or declining. More needs to be made of what is now being lost. No great intelligence may be needed to run complex technological systems, but more may be required to maintain them, and more still to develop them. Howeverthe most important point is that today the level of average intelligence needs to be higher than it is in order to operate and to survive in a complex society that can still be democratic.

Scientists cannot live in a Swiftian Laputa, above the doings of mankind. Artificial intelligence can be devised to do what humans cannot do well but scientists also have the knowledge to improve human ability to do what humans do well. There is now more

alertness to the fact that lawsuits and class actions now take place for human damage caused by medical and scientific innovations, so that they will not in the future be let loose on the public without intensive testing. In the future, there may well be lawsuits claiming psychological and neurological damages for some of the customs we allow to be inflicted on the general population without any concern for their psychobiological effects on the person.

Plato regarded popular democracy as a dangerous 'many-headed monster[1] because the *hoi polloi* were incorrigibly stupid. There are interests in the world who benefit from a stupid populace, and who could even be seen to be encouraging dumb thick-headedness, for commercial or political reasons -but the necessary premise of democratic institutions and universal education today is that the people can be educable and responsible. I have been trying to direct attention to what we may all know - in a way -but do not realise is urgent. The most serious energy crisis ahead is that of human energy.

References are illustrative of the field, rather than documentation. Social research and action on the prevention of "waste of people" is still a relatively neglected field, as MacKay's recent paper complains.

A short list of references

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Damascio, Antonio: *The Feeling of What Happens: Body and Emotion in the Making of Consciousness.* Harcourt Brace, 1999, p. 39.

Extract: [DJuring the twentieth century.... neuro-science and cognitive science has proceeded as though Darwin never existed.... Aspects of brain and mind have been discussed as if designed recently, as needed, to produce a certain effect—a bit like installation of antilock brakes in a proper new car— without any regard to the possible antecedents of mental and brain devices. Of late the situation is changing remarkably.

Birtchnell, John: *Relating in Psychotherapy: The Application of a New Theory.* Westport, CT: Praeger, 1999, p. 32.

Extract: The Inner Brain Knows What It Wants. The inner brain has a much clearer idea of what it wants and where it is going than the outer brain has. The inner brain works out all the priorities and makes all the decisions about how we should act, long before the outer brain is aware of what is happening. A normally restrained woman was talking to her husband in the bathroom and noticed him washing sand from between his toes. In the ensuing conversation it emerged that he had spent the day at the beach with another woman. In an instant, she had beaten him across the head and sent him tumbling down the stairs. She was quite taken aback by what she had done and realized that she could have killed him. Her action was an inner brain response. Her horror at what she had done and the realization of what she might have done was an outer brain response.

ABSTRACTS & EXTRACTS ...

Tomita H, Ohbayashi M, Nakahara K, Hasegawa I, Miyashita Y: Top-down signal from prefrontal cortex in executive control of memory retrieval. ***Nature*** **1999;401:699-701**

Abstract: Knowledge or experience is voluntarily recalled from memory by reactivation of the neural representations in the cerebral association cortex. In inferior temporal cortex, which serves as the store-house of visual long-term memory, activation of mnenomicengrams through electric stimulation results in imagery recall in humans, and neurons can be dynamically activated by the necessity for memory recall in monkeys. Neuropsychological studies and previous split-brain experiments predicted that prefrontal cortex exerts executive control upon inferior temporal cortex in memory retrieval; however, no neuronal correlate of this process has ever been detected. Here we show evidence of the top-down signal from the prefrontal cortex. In the absence of bottom-up visual inputs, single inferior temporal neurons were activated by the top-down signal, which conveyed information on semantic categorization imposed by visual stimulus-stimulus association. Behavioural performance was severely impaired with loss of the top-down signal. Control experiments confirmed that the signal was transmitted not through a subcortical but through a frontotemporal cortical pathway. Thus, feedback projections from prefrontal cortex to the posterior association cortex appear to serve the executive control of voluntary recall.

Kakei S, Hoffman DS, Strick PL: Muscle and movement representations in the primary motor cortex. ***Science*** **1999;285:2136-2139.**

Abstract: What aspects of movement are represented in the primary motor cortex (M1): relatively low-level parameters like muscle force, or more abstract parameters like handpath? To examine this issue, the activity of neuronsin M1 was recorded in a monkey trained to perform a task that dissociates three major variables of wrist movement: muscle activity, a direction of movement at the wrist joint, and direction of movement in space. A substantial group of neurons in M1 (28 out of 88) displayed changes in activity that were muscle-like. Unexpectedly, an even larger group of neurons in M1 (44 out of 88) displayed changes in activity that were related to the direction of wrist movement in space independent of the pattern of muscle activity that generated the movement. Thus, both "muscles" and "movements" appear to be strongly represented in M1.

Wan J-J, Poo M-M: Activity-induced potentiation of developing neuromuscular synapses. ***Science*** **1999;285:1725-1728.**

Abstract: Electrical activity plays a critical role in shaping the structure and function of synaptic connections in the nervous system. In *Xenopus* nerve-muscle cultures, a brief burst of action potentials in the presynaptic neuron induced a persistent potentiation of neuromuscular synapses that exhibit immature synaptic functions. Induction of potentiation required an elevation of Ca^{2+} and expression of potentiation appeared to involve an increased probability of transmitter secretion from the presynaptic nerve terminal. Thus, activity-dependent persistent synaptic enhancement may reflect properties characteristic of immature synaptic connections, and bursting activity in developing spinal neurons may promote functional maturation of the neuromuscular synapse.

Perry BD: The memories of states: how the brain stores and retrieves traumatic state. In (Goodwin J, Attias (Eds)). ***Splintered Reflections: Images of the Body in Trauma,*** **New York, NY: Basic Books, 1999, pp. 9-10.**

Extract: All organ systems of the human body have, to some degree, the property of memory: the capacity, unique to life forms, to bring elements of an experience from one moment to another in time to another. Memory is the foundation of every biological process

—from reproduction to gene expression to cell division, from receptor-mediated communication to the development of more complex physiological systems (including neurodevelopment)—and it forms the basis of the immune, neuromuscular and neuroendocrine systems. Through complex physiological processes, elements of experience can even be carried across generations. Elements of the collective experience of the species are reflected in the genome, while the experience of the individual is reflected in the expression of that genome.

No biological system has a more sophisticated capacity to make and store internal representations of the external world — and the internal world —than the human central nervous system, the human brain. All nerve cells store information, and this storage is time-bound, contingent upon previous patterns of activity. Neurons are specifically designed to respond and modify themselves in response to external cues (e.g., neurohormones, neurotransmitters, neurotrophic factors). These neurophysiological and molecular neurobiological properties have allowed the development of the complex functions mediated by the brain (thinking, feeling and acting). The cognitive, motor, emotional and state-regulating areas of the developing brain have organized in response to the experiences of the developing brain. And in *each* of the diverse brain systems that mediate specific functions, some element of previous experience is stored.

The storage involves complex neuromuscular processes: use-dependent changes on synaptic microarchitecture and intracellular alterations in various important chemicals involved in cellular communication and gene expression. The details—those that are known — are outside the scope of this chapter. Yet to understand that the physical properties of neurons change with experience is crucial to understanding the concept of memory. Simply stated, the brain changes with experience — *all* experience, good and bad. The focus of this chapter is how the brain changes by storing elements of a traumatic experience.

The human brain has evolved specialized capabilities that are reflections and the "selections" of millions of years of evolutionary pressures — Nature's greatest hits. The brain allows the human to sense the external and internal environment, process this information, perceive and store elements of sensations and act to promote individual survival and optimize the chances for successful mating —the key to the survival of the species.

In orderto do this, the brain creates internal representations of the external world — it takes information once external to the organism, transforms it into patterned neuronal activity and, in a use-dependent fashion, creates and stores these representations. A further remarkable characteristics of this internal representation is that the brain makes and stores associations between the bits of sensory information (e.g., sights, sounds, smells, positions and emotions) from a specific event (e.g., the pairing of the growl of the saber-toothed tiger and danger), allowing the individual to generalize to sensory information present in current or future events.

Kalayam B, Alexopoulos GS: Prefrontal dysfunction and treatment response in geriatric depression. *Arch Gen Psychiat* 1999;56:713-718.

Abstract: Forty-nine depressed elderly subjects were studied before and after 6 weeks of adequate antide-pressant treatment and compared with 22 psychiatri-cally normal controls. The psychomotor retardation item of the Hamilton Depression Rating Scale, the intiation/perseveration subscore of the Mattis Dementia Rating Scale, and the latency of the P300 auditory evoked potential were used as indices of prefrontal dysfunction. The intensity of antidepressant drug treatment was classified and monitored for a 6-week period.

Abnormal initiation/perseveration score, psychomotor retardation, and long P300 latency predicted 58% of the variance in change of depression scores from baseline to 6 weeks (F3=20.1, P<.001). Depressed patients who remained symptomatic (n=25) had more abnormal initiation/perseveration scores and longer P300 latency compared with depressed patients who achieved remission (n=24) and control subjects. There were no differences between the last 2 groups. The

association between psychomotor retardation, intiation/perseveration scores, P300 latency, and response to antidepressant treatment could not be explained by differences in demographic and clinical characteristics or treatment intensity between remitted and nonremitted depressed patients.

[In conclusion], prefrontal dysfunction was associated with poor or delayed antidepressant response in depressed elderly patients. This observation, if confirmed, may aid clinicians in identifying candidates for aggressive somatic therapies and for interventions offering structure of daily activities.

Welter L, Weller A, Koresh-Kamin H, Ben-Shoshan R: Menstrual synchony in a sample of working women. *Psychoneuroendocrinology* 1999;24:449-459.

Abstract: Menstrual synchrony has been typically studied among women who live together: dormitory roommates or family members sharing a bedroom or living in the same house. The current study examined menstrual synchrony in 51 pairs of women working together under conditions optimally conducive to synchrony. They had been together for at least 1 year, shared a relatively small office, worked there all day full time and contact with other people during the day was minimal. Prospective records of three menstrual dates showed a significant degree of synchrony for each of the 3 months. Menstrual cycles of close friends tended to occur on the average of 3.5-4.3 days of each other while onsets of co-workers who were not close friends were significantly more broadly ranged (7.7-9.0 days of each other). This is the first unequivocal demonstration of menstrual synchrony outside of the household.

Brooks A, Bandelow B, Pekum G, George A, Meyer T, Bartmann U, Hillmer-Vogel U, Ruther E: Comparison of aerobic exercise, clompramine, and placebo in the treatment of panic disorder. *Am J Psychiat* 1999;155:603-609.

Abstract: Forty-six outpatients suffering from moderate to severe panic disorder with or without agoraphobia *(DSM-IIIR* criteria) were randomly assigned to a 10-week treatment protocol of regular aerobic exercise (running), clomipramine (112.5 mg/day), or placebo pills. The dropout was 31 % for the exercise group, 27% for the placebo group, and 0% forthe clomipramine group. In comparison with placebo, both exercise and clomipramine led to a significant decrease in symptoms according to all main efficacy measures (analysis of variance, last-observation-carried-forward method and completer analysis). A direct comparison of exercise and clomipramine revealed that the drug treatment improved anxiety symptoms significantly earlier and more effectively. Depressive symptoms were also significantly improved by exercise and clomipramine treatment. [In conclusion], these results suggest that regular aerobic exercise alone, in comparison with placebo, is associated with significant clinical improvement in patients suffering from panic disorder, but that is less effective than treatment with clomipramine.

Di Fiore A, Rendall D: Evolution of social organization: a reappraisal for primates by using phylogenetic methods. *Proc Natl Acad Sci* 1994;91:9941-9945.

Abstract: For many animal taxa, the extent to which phylogeny can account for the form of species' social systems has seldom been investigated formally. A quantitative phylogenetic analysis of social systems in the order Primates reveals that social organization may be strongly conserved in some lineages, even in the face of considerable ecological variability. This result has important implications for efforts to understand the evolution of animal societies and for attempts to reconstruct the social organization of early humans.

Spinney L: Morphing mammalian brains (report on the address by Leah Krubitzer to the Society for Neuroscience, Miami, October, 1999) *BioMed News,* October 28,1999 (www.biomednews.com)

Extract: Among species evolved from a common ancestor the brain develops according to a common pattern. But within each of the lineages that diverge

from that ancestor, the pattern is modified by a combination of genetic and environmental factors. That was Leah Krubitzer's message to the 29th annual meeting of the Society for Neuroscience in Miami, where she gave a special lecture on her theory of the expansion and reorganization of the evolving brain.

In her lab at the Center for Neuroscience at the University of California, Davis, Krubitzer maps the cortical representation of sensory systems in mammals. The species she chooses to study vary from spiny anteaters and marsupial mice to macaque monkeys and humans and represent lineages that diverged at different stages of mammalian evolution. By comparing the architecture of those cortical fields she is able to identify common features as well as ones that are unique to the species, and work out how brain construction has responded to the demands that evolution and specialization have placed upon it.

She is particularly interested in how new cortical fields are added through evolution, and how the cortex subsequently expands. Her model starts with a common ancestor with a basic cortical organization involving a few distinct fields. As evolution progresses, lineages diverge and adapt to their environments by evolving specialized sense organs, such as the electrosensory receptors of the duck-billed platypus, so that the cortex receives new types of input. New modules of neurons emerge in the cortex to represent these new types of input, and are initially embedded within larger sensory areas. Gradually they aggregate, and in some cases float away to form new and distinct cortical fields.

The model explains many of the observations that she has made using electrophysiological and imaging techniques. For instance, species differ in the size of the cortex and in the proportion that is allotted to each sensory system. The cortices of the mouse and the marsupial mouse, ordunnart, are similar in size. The mouse has a relatively large somatosensory area for the processing of touch, and a small primary visual area (V1). But in the dunnart, which has a highly developed visual system, V1 is vast—occupying about a third of the entire cortex. Different species also have different patterns of cortical connections and different internal organization of sensory areas. So within the somatosensory area of the platypus, a high proportion of neurons are devoted to the bill.

The amount of the neocortex devoted to different sensory systems is related to the animal's morphological specializations which in turn are related to its behavioral specializations," says Krubitzer. While many aspects of brain construction are undoubtedly shaped by the genes, such as the overall size of the cortical sheet, the gross identity of regions and the density of various receptor types, environmental factors also make a contribution. One example is the behavior associated with specialized body parts—the bill of a platypus, or the larynx, tongue and lips of a human. Those environmental constraints not only give rise to variability between species, but also within species and within genotypes. And according to Krubitzer, they include social learning and culture.

"The number of possible phenotypes that emerges from a given genotype is governed by the environment in which that individual develops," she says. "So a genotype that is unraveling in an environment with language and culture and social learning will, I suggest, have a different brain in terms of organization and even connections than a genotype that unravels in an environment that isn't socially or culturally rich." One hundred thousand years ago, she adds, Homo sapiens might have had a very differently organized brain from his modem counterpart.

Moore P: No Plasticity for Bad Behavior (report on the address by Daniel Tranel **to the Society for Neuroscience, Miami, October, 1999) *BioMed News,* October 28,1999 (www.biomednews.com)**

Extract: If infants suffer permanent damage to an area of their brain, the ability to perform tasks normally assigned to that region are often not lost because the remaining healthy tissue takes over the function. Howeverthis does not appear to happen when the area responsible for moral and social awareness is damaged. New data presented at the 29th annual meeting of the Society for Neuroscience in Miami, USA, shows that two people who had lesions in their prefrontal

cortex during infancy, appeared to have severely impaired moral and social awareness as adults.

Making moral and social judgements is something that we do each day, and is so much part of our makeup that we appear to do it without thinking. However, it does involve our brains. For more than a decade scientists have realized that adults who experience damage to the prefrontal cortex often become psychopathic, losing their ability to make morally and socially acceptable decisions. As Daniel Tranel, from the University of Iowa, USA, explains, at a reasoning level they are aware that their behavior has implications for the people around them, but they dont show any remorse or guilt. 'They can give you a logical explanation of why they are behaving in a highly anti-social manner," he says, "but they have very poor insight about the chaos they are causing around them."

"The question came up, what would happen if this sort of lesion occurred in the brain very early on in life?" says Tranel. "It is an important question because we know that other types of function, like for example language, can move if the normal area of the brain is damaged, and the kids can get perfectly normal language development despite a critical lesion."

Tranel and his colleagues' attention were drawn to two people who had prefrontal lesions that had occurred in infancy. One was a woman who had been run over by a vehicle at 15 months of age, and the other was a man who had had a right frontal tumor removed when he was 3 months old. Both had apparently made full recoveries, but then became severely disruptive later in life and were incapable of forming friendships. They did not respond to treatment and 'correctional facilities' had no effect.

By the time they reached their early twenties their behavior was having a severely damaging effect on their families, and they were financially and sexually reckless. The man had fathered a child, but showed no concern about the infant, and the woman had given birth, but her maternal behavior was marked by dangerous insensitivity to the infant's needs.

So, Tranel claims, it appears from these cases that the structure of the brain with regard to moral and social behavior is not particularly plastic; These are the earliest onset lesions that anyone has ever studied, and both of the people have completely disastrous social and moral behavior."

There is, however, an interesting difference between the people who get a lesion as an infant and those whose brains are damaged later in life. Those who receive the lesion as adults are still capable of discussing situations and reaching conclusions that are considered to be morally normal, while those who acquire the lesion in childhood cannot. 'The implication is that their systems are not capable of acquiring social and moral knowledge even at a normal level," says Tranel.

Mesterton-Gibbons M: On the Evolution of Pure Winner and Loser Effects: A Game-theoretic Model. *Bulletin of Mathematical Biology,* 1999,-61:1151-1186

Abstract: The persistence of linear dominance hierarchies is often attributed to higher probabilities of a win after a win or a loss after a loss in agonistic interactions, yet there has been no theory on the evolution of such prior-experience effects. Here an analytic model, based on the idea that contests are determined by subjective perceptions of resource-holding potential (RHP) which animals may revise in the light of experience, demonstrates that winner and loser effects can evolve through round-robin competition among triads of animals drawn randomly from their population, and that the probability of a hierarchy increases with the strength of the combined effect. The effects are pure, in the sense that a contestant observes neither its own RHP nor its opponent's RHP or RHP perception or win-loss record; and so the strength of an effect is unmodified by the RHPs of particular individuals, but depends on the distribution of RHP among the population at large. The greater the difference between an individual's and its opponent's RHP perception, the more likely it is to win a contest; however, if it overestimates its RHP, then the cost of fighting increases with the overestimate. A winner or loser effect exists only if the fitness gain of the beta individual in a hierarchy, relative to that of the alpha, is

less than 0.5. Then a loser effect can exist alone, or it can coexist with a winner effect; however, there cannot exist a winner effect without a loser effect.

Blakernore SJ, Frith CD, Wolpert DM: Spatio-temporal prediction moulates the perception of self-produced stimuli. *J Cognitive Neuroscience* 1999;11:551-559

Abstract: We investigated why self-produced tactile stimulation is perceived as less intense than the same stimulus produced externally. A tactile stimulus on the palm of the right hand was either externally produced by a robot or self-produced by the subject. In the conditions in which the tactile stimulus was self-produced, subjects moved the arm of the robot with their left hand to produce the tactile stimulus on their right hand via a second robot. Subjects were asked to rate intensity of the tactile sensation and consistently rated self-produced tactile stimuli as less tickly, intense, and pleasant than externally produced tactile stimuli. Using this robotic setup we were able to manipulate the correspondence between the action of the subjects' left hand and the tactile stimulus of their right hand. First, we paradigmatically varied the delay between the movment of the left hand and the resultant movement of the tactile stimulus on the right hand. Second, we manipulated varying degrees of trajectory perturbation and varied the direction of the tactile stimulus movement as a function of the direction of left-hand movement. The tickliness rating increased significantly with increasing delay and trajectory perturbation. This suggests that self-produced movements attentuate the resultant tactile sensation and that a necessary requirement of this attenuation is that the tactile stimulus and its causal motor command correspond in time and space. We propose that the extent to which self-produced tactile sensation is attenuated (i.e., its tickliness) is proportional to the error between the sensory feedback predicted by an internal feedback model of the nervous system and the actual sensory feedback produced by the movement.

BodmerWF: Know thyself genetically. Review of Ridley M: *Genome: The Autobiography of Species in 23 Chapters.* Fourth Estate, 1999. *Nature* 1999;401:852-853.

Extract: Genetics, I believe, will stand alongside computing and nuclear physics as one of the outstanding areas of development by which this century will be remembered. The century started precisely with the rediscovery of Mendelism and it will finish with a first draft of the complete DNA sequence of the human genome. That remarkable catalogue of the human genes, ordered along the chromosome to give us the Book of Man, will form the basis of most future biological and biochemical investigations of humans. The end of the Human Genome Project is the beginning of the real genetics of mankind. And this is the substantial challenge for understanding over the next century or so.

By combining the power of molecular genetics with classical population genetics and quantitative analysis, new approaches have been devised, not only for the 'positional' cloning of Mendelian traits whose biochemical basis was totally unknown, but also for identifying genes that contribute to the inherited susceptibility to multifactorial traits and diseases. Genes associated with nearly every Mendelian disease have been cloned, however rare the disease. But recall the great physician, William Harvey, who urged us to treasure the exceptions, from which, as we now know, so much can be learnt. There is an exciting story to be told about genetics in the genomic era, but this is not be found in Matt Ridley's book....

O'Briens J, Menotti-Raymond M, Murphy WJ, Nash WG, Wienberg J, Stanyon J, Copeland NG, Jenkins NA, Womack JE, Graves JAM: The promise of comparative genomics in mammals. Science 1999:285:458-481.

Abstract: Dense genetic maps of human, mouse, and rat genomes that are based on coding genes and on microsatellite and single-nucleotide polymorphism

markers have been complemented by precise gene homolog alignment with moderate-resolution maps of livestock, companion animals, and additional mammal species. Comparative genetic assessment expands the utility of these maps in gene discovery. In fundamental genomics, and in tracking the evolutionary forces that sculpted the genome organization of modem mammalian species.

Extract: Tens of thousands of mammalian species have emerged, diverged, and disappeared [over the 63 to 66 million years since an abrupt extinction of the dinosaurs that created a vast ecological vacuum], and the 4600 to 4800 species living today comprise approximately 28 orders, including the most primitive egg-laying mammals,... 7 marsupial orders, and 20 placental (eutherian) orders. Encrypted in the genomes of surviving species are novel genes, lost genes, modified genes and reordered genes. There blueprints for species adaptation are vestiges of pivotal changes that discriminated a whale from a bat, a dog from a cat, or a chimpanzee from a human. Today's molecular deciphering of the genomes of living species, whether focusing on homologous gene sequences, gene segments, chromosomes, or entire genomes, provides a new vision of important evolutionary questions about natural history, species origins and survival, and adaptation to occupy ecological niches. The comparative genomics approach is already revealing valuable insights into developmental functions, reproductive enhancements, and disease defence mechanisms that have protected our ancestors (and ourselves) from extinction....

All mammals contain between 70,000 and 100,000 genes arranged in linear order along their chromosomes, with a total length of about 3.2 billion nucleotide pairs.... Gene maps have been constructed in human, mouse, and about 30 other mammal species for two general reasons: first as a resource for locating the genetic determinants of heritable characteristics, behaviors, and phenotypes; and second, as a template for resolving and intepreting patterns of evolving genome organization in their ancestry....

A still-unfulfilled promise of comparative biology is a unified view of the evolutionary divergence and origin of mammalian species.... By comparing the conserved syntenies revealed by gene maps and chromosome painting, two very different rates of genome rearrange ments have been observed. A high degree of genomic conservation is the predominant mode for the mamma lian genome .... [T]he human and mouse X chromo somes retain the same genes, but the relative orders of gene homologs have been rearranged by inversions of at least six homology segments. In contrast, alignment of gene orders discerned [in] cat and human shows that the feline and human gene order are identical. These observations reinforce the impression that cat and human genome organizations are close to the ancestral version for their respective orders and perhaps for mammals in general, because similar genome-wide conservation is also apparent in whole eutherian genome comparisons of human/cat with... cow and sheep,... horse,... bat,... and ... shrew.

[Expectations with regard to basic biology [include] the chance to understand whether [long] linkage associations preserved fortens of millions of years through billlions of individuals in thousands of species are merely "frozen accidents" or were selectively retained by developmental or functional dependence.

Wolffe AP, Matzke MA: Epigenetics: regulation through repression. *Science* 1999;286:481 -486

Abstract: Epigenetics is the study of heritable changes in gene expression that occur without a change in DNA sequence. Epigenetic phenomena have major economic and medical relevance and several, such as imprinting and paramutation, violate Mende-lian principles. Recent discoveries link the recognition of nucleic acid sequence homology to the targeting of DNA methylation, chormosome remodeling, and RNA turnover. Although epigenetic mechanisms help to protect cells from parasitic elements, the defense can complicate the genetic manipulation of plants and animals. Essential for normal development, epigenetic controls become misdirected in cancer cells and other human disease syndromes.

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