

ASCAP NEWSLETTER

Across-Species Comparisons And Psychiatry Newsletter

Volume 5, No. 2, 15 Feb 1992 (Cumulative #51)

"...biological evolution...has provided us with a brain whose capacity is of the order of 10^{15} bits... [This] corresponds roughly to the content of all books ever written--not bad for a biomolecular store that operates on less than 50 watts. A computer scientist trying to configure such a gigantic storage device would have to put together a unit consuming about 100 megawatts of power." Haarer, 1992¹

The ASCAP Newsletter²
is
a function of the

International Association
for the Study of
Comparative Psychopathology
(IASCAP)³

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Newsletter aims: 1. A free exchange of letters, notes, articles, essays or ideas in whatever brief format.
2. Elaboration of others' ideas.
3. Keeping up with productions, events, and other news.
4. Proposals for new initiatives, joint research endeavors, etc.

IASCAP Mission Statement; The society represents a group of people who view forms of psychopathology in the context of evolutionary biology and who wish to mobilize the resources of various disciplines and individuals potentially involved 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 that focusing on cellular processes to that focusing on individuals to that of individuals in groups.

Comment #1; This issue has many small items, not only brief features, but the three Announcements include one of now available videotapes--in fact an entire article. We hear in Letters from Irina Zhdanova who had a wonderful time visiting the USA! A quoted Abstract tells about a neurotransmitter receptor found deleted in Angelman syndrome (disregulated laughing).

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Comment #2; An IASCAP planning meeting will take place at UTMB in Galveston, Texas, on March 23, 1992, in con-

junction with informal discussions and a show-and-tell slide show the preceding day (March 22). The timing has been determined by John Price's visit in the course of his return to England after blissful months in Belize (see his communication stemming from snorkeling reflections on page 6). The slides will be courtesy of Greg Dimijian and John Battaglia from Dallas who will show their wildlife slides on Sunday, Mar 22nd.

During the next morning, Monday, from 10:30 to 11:50 a.m. John Price will provide UTMB's Department of Psychiatry and Behavioral Sciences with their weekly Grand Rounds session on Evolutionary Perspectives on Psychiatry. During that afternoon for those who can come (largely the Sunday participants) will engage in planning a first general IASCAP meeting in April, 1993, planned to be held in Galveston in conjunction with an educational planning conference on a biological basic science for psychiatry. The latter will be a small by-invitation meeting dependent upon funding so if you are aware of funding sources, please let us know!

All IASCAP members and interested others are most welcome to all three March meetings. To this point, they have not been publicized, so we don't expect large numbers but rather an informal small group atmosphere (a Texas Birmingham group perhaps). Ask for details if you can come. Send ideas if you can't.

Announcement: Eleventh International Congress of International Society of Human Ethology (ISHE). 26-31 July 1992, Amsterdam, The Netherlands, will be held at the Royal Tropical Institute at the perimeter of the old City center. Four distinguished scientists will be invited to discuss their work during plenary sessions early in the morning covering the following four topics: (1) Stress and

the diseases of adaptation, (2) The evolutionary theory of socialization, (3) Ethology and psychopathology, and (4) Issues of survival and reproductive success. Oral papers are solicited for each late morning and afternoon, each 20 minutes with 10 minutes discussion on all areas of human ethology. Symposia, posters, film/videos and round tables can be arranged. Chair of congress is Frans X Plooij helped by Netty Bouhuys, Herman Dienske, and Anneke Vrugt.

Dr. Plooij can be contacted at:

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Announcement: Eighth Annual Meeting of the Language Origins Society (LOS): The 1992 meeting will take place 7-10 Sept at Selwyn College, University of Cambridge, England. The organizer is Dr. Leonard Rolfe:

Dept. of Psychology
University of Lancaster
Lancaster, LA1 4YF,
UNITED KINGDOM

Those planning to give a paper should send an abstract to Dr. Rolfe by May 1, 1992. The LOS hopes to meet in Russia in 1993 hosted by Titiana Chernigovskaya of the Institute Evolutionary Physiology at the Acad of Science in St. Petersburg.

Announcement: Videotapes are now available of Chimpanzees in the Wild! by Dr Adrian Kortlandt

During 1963-1967, my colleagues and I shot three 16mm films on chimpanzees in the wild in Africa. This material has been used until now mainly to illustrate my lectures. Some of it has also been shown on television worldwide. A few years ago, when my Department at the University of Amsterdam

was facing closure, I decided to make the films more widely available by producing re-edited videotapes of them and adding spoken commentaries. These videos are now available for sale on VHS-PAL (for Europe except France) and on VHS-NTSC (for the US and Japan).

The research technique shown in the videos and the scientific philosophy behind it were developed in early 1960, at a time when no one had ever been able to watch, photograph or film chimpanzees undisturbed at close quarters in the wild. The trick was simple: first, see-through frameworks of plant material were built along regular chimpanzee paths and in their preferred foraging areas. Day by day more plants were woven in while the apes could still see that no one was hiding--until I was to occupy these "bushes" unnoticed. Thus, human disturbance was minimized. The result was that chimpanzees could be observed almost daily, in numbers varying up to 48 per session.

In addition, experimental techniques were applied in accordance with the von Frisch-Lorenz-Tinbergen tradition which combines intensive observation with meaningful experimentation. Seventy test objects were placed, in a natural manner, alongside the chimpanzee paths. These included, among other things, trinkets, familiar and unfamiliar foods, potential prey animals, poisonous snakes and, in eight tests, an animated leopard (three times with a chimpanzee in its paws). The food tests showed strong conservation of choice. No carnivorous tendencies were observed in forest-dwelling chimpanzees. The stuffed leopard was only mobbed and threatened in forest habitats in Zaire and Guinea, but severely attacked with big clubs and finally decapitated in a savanna habitat in Guinea.

The methodology has the advantage that scientific questions can be solved under excellent, pre-set observation and filming conditions, and without delay. Nevertheless, many chimpanzee field workers ignore these methods, apparently on ideological grounds. Some of them even go as far as to ignore data obtained by these methods (e.g., Goodall in The Chimpanzees of Gombe. 1986, and Boesch in Behavior 1991: 117:220-242). I hope therefore that the promotion and circulation of my videos will give viewers an opportunity to compare the results and to make up their own minds. In addition, many parts of the videos are excellent teaching material in observation practice for zoologists and anthropologists because they show the ambivalent motivations in the test responses. These films are,

after all, the only existing chimpanzee films produced for purely scientific purposes, rather than for popular TV viewing. The titles are:

1. Kortlandt A, Bresser EG: Experimentation with forest-dwelling chimpanzees in the Congo (now Zaire), 1963. (Revised edition, 1989).
2. Kortlandt A, Trevor S: Experimentation with forest-dwelling chimpanzees in the Congo (now Zaire), 1964. (Revised edition, 1986).
3. Kortlandt A, van Orshoven J, Pfeijffers R, van Zon JCU: Chimpanzees in the wild, Guinea, 1966-1967. (Revised edition, 1981).

These three videos, each lasting about 45 minutes, will be sold only together as one package because they constitute a single research project. A short video showing the preparatory tests in captivity is added: Kortlandt A, Kooij M: Protohominid behaviour in primates.

A set of reprints relevant to the research project and transcripts of the spoken commentaries to the videos will also be added. The film of the 7th Netherlands Chimpanzee Expedition (1968-69) which was produced by a commercial company is, however, not included because no scientific version has been made.

The VHS-PAL sets (for Europe) will cost English £95, German DM 280 or Dutch f300 per set, including p&p, and can be ordered from me (see below).

Producing VHS-NTSC sets (for the US and Japan) requires more specialized machinery which involves higher costs. My preliminary estimate is that producing one single set at a time would cost about \$1000, five sets \$300, and ten sets \$220 per set. Therefore, please let me know if you would like to order a set, and which (maximum) price, so that I can pool the orders at the lowest costs. In the meantime, I am trying to find out if a cheaper production would be possible in the United States, perhaps with the help of the Wisconsin Primate Center Audio-Visual Library. If so, ASCAP Newsletter readers may like to be informed. Please note that copying from VHS-PAL to VHS-NTSC cannot be allowed because quality is lost (originals are on U-matic and BCN tapes).

A. Kortlandt's address is:
88, Woodstock Road
Oxford OX2 7ND
ENGLAND

A bibliography of selected publications by producer and colleagues are footnoted.

Letters;

27 Jan 1992

...My current preoccupation is with the maddening spectrum which starts with psychogenicity at one end and ends with symbiosis at the other. Look at the Jan '92 issue of Scientific American about this. [Rennie R: Trends in parasitology: living together. Sci Amer 1992;266(#1):122-133. The article's byline reads: "Parasites and their hosts have devised many odd strategies"]

Thanks...for putting me on the membership of IASCAP...I'll also value your ideas about the course [see feature p8] when we get together in March [see above].

How about a 4-day conference in April 1993 with a few lesser-known speakers - say, Wilson, Williams, Dawkins, Trivers, Maynard Smith, Gould...?

Greg Dimijian, Dallas, Texas

Letters; (continued) January, 1992

Thank you so much for a lot of scientific information you sent me... These were really very interesting and useful for me, especially the study which was done by in vivo NMR spectroscopy in drug-naive schizophrenics.⁵ I didn't even know that there is a possibility to work with a human with this method. When I worked in Budapest, I tried to produce such a study in rats in collaboration with the Hungarian Institute of Chemistry, but we failed because their NMR tube was too small for the rat. Do you know if these researchers in Pittsburgh work only with patients or do their interests include animals models as well?

My trip to the US was very interesting and productive. It was very useful for me to make seminars in those Universities I was invited to, because discussion with highly qualified scientists always gives a lot of information to think about and new ideas to realize in future

studies. As far as I understood my point of view on the social models of affective disorders and model of choice between social and individual motivations I work with in rats and primates were considered as new and interesting.

What is more, in every place I was, I met so nice, kind, clever and helpful people, that reminiscences about them make my emotional state here in Russia much better. It is quite necessary, as our "interesting times" without food make people too sad.

Most of December I spent in Dr Richard Wurtman's lab in MIT. We prepared two grant proposals for collaboration, so if we'll be successful I'll have a chance to work for some time in US in the future.

I think the idea to study second messengers and high-energy metabolism in the white cells of monkeys in the models of affective disorders can be very productive. I've read about interesting study of Rene Klysuer et al from the University of Copenhagen who measured cAMP formation in leukocytes from manic-depressive patients. They conclude that changes in receptor in leukocytes may be a state-dependent marker in depressive illness. But while in Russia I can only dream about such experiments.

Hope to read new interesting ASCAP issues in 1992.

Best wishes to you and to IASCAP.

Irina Zhdanova, St. Petersburg, CIS

Abstract; Wagstaff J, Knoll JHM, Fleming J, Kirkness J, Martin-Gallardo A, Greenberg F, Graham JM, Wenninger J, Ward D, Venter JC, Lalande M: Localization of the gene encoding the GABA_A receptor β 3 subunit to the Angelman/Prader-Willi region of human chromosome 15. Am J Human Genet 1991;49:330-337. Deletions of the proximal long arm of chromosome 15 (bands 15q11q13) are found in the majority of patients with two distinct genetic disorders, Angelman syndrome (AS) and Prader-Willi syndrome (PWS). The deleted regions in the two syndromes, defined cytogenetically and by using

cloned DNA probes, are similar. However, deletions in AS occur on the maternally inherited chromosome 15, and deletions in PUS occur on the paternally derived chromosome 15. This observation has led to the suggestion that one or more genes in this region show differential expression dependent on parental origin (genetic imprinting). No genes of known function have previously been mapped to this region. We show here that the gene encoding the GABA_A (gamma-aminobutyric acid) receptor β 3 subunit maps to the AS/PUS region. Deletion of this gene (GABRB3) was found in AS and PWS patients with interstitial cytogenetic deletions. Evidence of a B3 gene deletion was also found in an AS patient with an unbalanced 12;15 translocation but not in a PUS patient with an unbalanced 9;15 translocation. The localization of this receptor gene to the AS/PUS region suggests a possible role of the inhibitory neurotransmitter GABA in the pathogenesis of one or both of these syndromes.

International Society for Human Ethology (ISHE) by Glenn Weisfeld

ISHE was formed in 1974 to promote perspectives on the study of human behavior. It has about 330 members from 25 countries. The current president is Irenaus Eibl-Eibesfeldt, head of the Max Planck Institute for Human Ethology and author of the definitive (only!) textbook on human ethology.

Psychiatrists and others in related fields may be interested in ISHE; a number of psychiatrists already are members. A wide range of other disciplines is also represented.

Conventions are held annually; the next one will be in Amsterdam in late July--see announcement above. These conventions are small, informal, and inexpensive.

ISHE publishes a quarterly newsletter and a membership directory. The newsletter contains articles, book reviews, and announcements concerning human ethology and sociobiology. Currently a series of memoirs about the early development of the field of human ethology is being featured. The announcements provide news of other professional societies, conventions,

bibliographies, etc.

Each issue also lists the references to about 75 current articles, books, and chapters on ethology, sociobiology, and related fields. Author address is included for easy reprint request.

Membership in ISHE, which includes a subscription to the Human Ethology Newsletter, is by calendar year. The first issue of 1992 will appear in March, so this is an ideal time to join. New members will also receive a copy of the Membership Directory, published in 1991, while supplies last. The Directory gives the members' addresses, telephone and FAX numbers, disciplines, and research interests. Members are cross-listed by country and (in N America) state or province.

To join, send a personal check made out to the International Society for Human Ethology, drawn on a US bank, to Jay R Feierman, M.D., Presbyterian Behavioral Medicine Center, 1325 Wyoming Blvd., Albuquerque, NM 87112. Regular dues are \$20 per year, \$50 for three years; student dues are \$10 per year, \$25 for three years. Include your name, address, telephone number, institutional affiliation, discipline, and research interests. Europeans may send payment to Dr Herman Dieneske, Primate Center, TNO, PO Box 5815, 2280 HV Rijswijk, The NETHERLANDS, preferably in the form of a Eurocheque in Dutch currency: £40 per year (£20 for students) and £100 for three years.

For a free sample of a recent issue of the Human Ethology Newsletter, write directly to the editor, Glenn Weisfeld, Department of Psychology, Wayne State University, Detroit, MI 48202, (313) 577-2835 (office), 577-2801 (messages), 577-7636 (FAX).

Communication from Belize on Sexual Selection by John S. Price

While snorkeling lazily on the coral reef, I have been contemplating

the phenomenon we have variously called polyadic selection or the external mediation of sexual selection; that is, when the outcome is decided by the other individuals of the species rather than by the competing couple (in the case of intrasexual selection) or the courting couple (in the case of epigamic selection). For example, the relative rank of A and B is decided by C, D, E, etc; and whether A mates with B or C is decided by D and E, etc (usually parents). This seems to be such a powerful, and flexible, form of selection that it must be of great significance for human evolution. Does it occur in lower forms?

I have been thinking of social insects, in whom the workers determine the development of grubs into either queens or workers by differentiated feeding. Do they select certain grubs to be queens, or just a certain proportion of them? If they selected them for some quality related to fitness, it would be of interest, but then at that stage of development it would be only physical and not behavioral characteristics which were the criterion for selection. But what about later on in the insect's development? Do the workers evaluate the sexual forms and influence which survive for the nuptial flight? It would be quite possible for the workers to apply tests of behavioural dexterity or intelligence to the potential drones and queens, and then get the soldiers to eliminate those who do badly. It would not be surprising if this kind of external selection had evolved in insects, bearing in mind that they have evolved agriculture, stockherding and slavery. Has it? Do you know any entomologists who might give an opinion? Or could we call on ASCAP readers to comment?

While you have your entomologist buttonholed, please ask him to explain a phenomenon that seems

generally accepted in Belize--namely that the longer people have been here, the less they are bitten by insects and the less prolonged the results of any bites they get. Surely you would expect sensitization to insect toxins rather than immunity? Is it to do with suntan? Or that insects like novelty? I am confused.

As invited [before], please bring the whole ASCAP editorial office out here for a week in February--we could make great strides.

John S. Price, San Pedro, Belize

Response to snorkeling fantasies RG

One problem with using social insects as a model is that their eusocial evolution is convergent with that of eusocial humans: that is, the common ancestor of the two creatures (some kind of worm probably) almost certainly did not display the social behaviors of ants/bees nor humans. The basic plans from whence the social adaptation eventually sprung are incredibly ancient.

Of course, this is not a problem that completely blocks our use of it for modeling, but the remoteness of our common ancestry makes the likelihood of any common mechanisms equally remote. We will perhaps learn of design features but not mechanics: ultimate not proximate causation.

As Greg Dimijian has pointed out, and has been reviewed in the most recent issue of American Scientist (Jan-Feb, 1992), the nude mole-rat located mostly in Africa is another example of striking eusociality, with only a few individuals reproducing and the rest of the colony "working" for the good of the group. Certainly they too are displaying convergent evolution with humans (the common ancestor of rodents and humans probably diverged more than 100 million years ago--an insectivore perhaps--and probably also did not display the trait of polyadic selection), but this

basic plan is likely a "recent" one and whatever genes had to be modified were less drastically so. The platform from which the specialization sprung is one shared at a higher level (see Figure p13).

For example, the macromolecules of chimpanzees and humans are so similar that regulatory molecules alone are thought to account for their differences. Of course we don't know which regulatory molecules and what the rules of molecular selection are. In any event, comparing the eusociality of the nude mole-rat and humans seems more likely relevant than the comparison of insects and humans.

Not that the nude mole-rats are easy to study. Being underground creatures, they avoid light, not to mention limelight, assiduously. Interviews with the ones that are candidates for choosing the sexual ones (after finding which animals choose and how the choosing is done) may be even more confusing than what voters in New Hampshire are saying to reporters for why they are voting for candidates in the US presidential primary! For human voters undue sexual prowess seems to be a turnoff for potentiality as leaders!

Response to Michael Waller

by Carolyn Reichelt

Michael Waller writes an interesting and complex tale to solve John Price's "enigma." The comparator gene with all of its hypothesized activity is certainly an ingenious idea and may prove more or less accurate--who knows? But I'd like to respond to a few of the issues addressed, because I rather think that there are some more parsimonious explanations than Waller's. Jacob's evolutionary tinkerer is rather a lazy sort, and usually fools around with the materials at hand rather than building something from scratch. In this case, there are plenty of materials

already on hand that can do the job perfectly well with only a little modification. For example, with regard to Dr Price's evolutionary problem, it is entirely possible that the gene(s) associated with the genesis of depressive illnesses have not been selected out: their disabling-to-lethal effects manifest themselves sufficiently past puberty that they would have little effect on reproduction. This argument seems particularly persuasive if one considers that humans throughout time began reproducing much earlier than we presently do in western society. Our artificially delayed adulthood is an artifact of our culture and much of the world still obeys biology's dictates in this matter. Nor is the retention of an illness-producing gene unusual. There are many perfectly good examples of other genetically influenced diseases that remain in the gene pool, that haven't been selected out -- juvenile onset diabetes, for an obvious one. So I fail to see why depressive illnesses should be particularly different.

Also with regard to the problem of why the "disabling emotional reaction" to losing has not been selected out: from an evolutionary standpoint, a low profile in the spirit of self-preservation through submission may be a perfectly good response for a loser in intra-sexual competition. Certainly there are multiple examples of submission-as-strategy throughout the phyla. It is only (so far as we can tell) in humans that things get out of hand and the individual may overdo the submission and become depressed. As already noted, this will not have ultimate effects if he/she has already contributed to the gene pool, and thus the existence of chronic or manic-depression does not contradict the conventional (to subscribers of ASCAP at any rate) hierarchical explanations of depression. Furthermore, if depression is under-

stood not as an adaptive behavior, then there is no need for such complexities as the comparator gene--its postulated functions are performed as a by-product of other social communications. Diabetes is again a good example: it results from a genetically influenced distortion of an adaptive bodily function. Then too, genes have multiple effects. Therefore, it is reasonable to suppose that any gene that codes, for whatever biological reason, for the extreme submissive behaviors that we call hypothetically call depression may have balancing effects that keep it in the genetic library, just as in the example of the gene that produces sickle cell anemia--and confers protection from malaria.

As to self esteem: Mike Waller tells us that the variations we humans experience in our self esteem imply the presence of a comparator gene. In view of our present rudimentary state of genetic knowledge, one should never rule anything out, but when so many species--including ours--live in hierarchical societies and self esteem issues seem to fall within the hierarchical domain, the comparator gene would seem unnecessary as an explanation. For animals born into a hierarchically arranged species, it is to her/his role in the society in the society and does this through dominant or submissive behaviors, among others. This occurs through the auspices of neurochemistry, of course. Since hierarchical societies are so common throughout phyla, it seems to me reasonable to suppose that evolution has encouraged adaptive social docility through the use of neurochemicals that reinforce socially "good" behavior. The individual's feelings about self-in-relation-to-others in the group may stem from the promptings of those neurochemicals as they ebb and flow in the system in a complex dance choreographed by both ex-

ternal and internal/historical stimuli. But if the animal carries a defective gene that over- or under-regulates the production of these neurochemicals, the result can be a perfectly good adaptive mechanism gone awry. Feelings about self-in-relation-to-others in the group are an essential component of a successful society; for the animal to gain its designated role in the society and is more likely to do so if there is either an external or internal reward (or both). Position within a hierarchy is strongly genetically influenced, usually matrilineally. It seems more thrifty evolutionarily for the social-rank-influencing gene to also deal with socially very useful self esteem activity. We have good hard biological experimental reasons to postulate a rank-regulating gene; it would be efficient for that same gene to perform the self esteem regulating functions, since the functions are so very similar--one really being an extension of the other. So why do we need to postulate a comparator gene when the same effects could stem from a more basic source--something already designed into the *bauplan*, one might say? With this simpler approach, one doesn't need to worry about "cunning little progenitors"--there are perfectly good evolutionary explanations for the problem posed. There is an old principle in medicine that one first considers the simplest explanation. If the patient presents with no or a low fever, a cough, and a steaming nose, the physician at least first expects the common cold before doing a work-up for allergies. Perhaps we should learn from that.

Questions and Concepts to Take Away
(Behavioral Ecology for Psychiatry
Residents) by Greg Dimijian

From 1 Jan 1992 letter:

John Battaglia [also from Dept of Psychiatry,

Southwestern Medical School, Dallas, TX] suggested that I send you handouts made for the course on behavioral ecology for residents in psychiatry]. They reflect the brevity of the course--only 3 sessions, of 1½ hours each.

I have much longer notes which I'm expanding all the time, which I'll be glad to share if you [or readers of ASCAP] ever want. They're only notes at this point, though, and you'd probably get more out of the sources--the sources are often a flurry of journal articles, most of which I have in my files.

From 27 Jan 1992 letter:

I'd be delighted for the handouts [used for a course for residents in psychiatry] to go in an issue of ASCAP and hope they bring us all some feedback. [References for the authors or points mentioned are available on request.]

#1: Hypothetico-deductive method.

Ultimate vs. proximate determinants.

How are traits believed to arise?

- natural selection (including sexual selection.
- neutral mutations.
- genetic drift (small populations)
- mass extinctions
- domestication

Evolutionary theory is an historical science--some say "soft"--not deterministic nor predictive--contingency is the hallmark of history.

Phenotype=substrate, physiology, ontogeny, and behavior.

"Extended phenotype:" think of brood parasites and slave-making ants.

Levels of selection: principally gene and individual.

Individual-colony continuum---nature abhors boundaries (and definitions!)--what are eukaryotes? what is Portuguese Man-o-War? what is a social insect colony?

Sexuality and the host-parasite (host-pathogen) arms race: Red Queen hypothesis.

What boundaries do we put on the definition of behavior?

#2 Neuroevolution:

- only *bilaterally* symmetrical animals are known to have evolved a brain.

- left-right bilateral symmetry is only skin-deep!
- messenger molecules have been conserved across species and are universally synthesized either in neurons or by ribosomes (the latter with instructions from RNA).
- the complex nervous system of octopus is more decentralized than ours, with most neurons in arm ganglia.
- invertebrate-vertebrate transition.
- hierarchical integration of new with old.
- different perceptual worlds of other animals.

Terminology in behavioral ecology: use of words borrowed from human behavior, such as altruism, deceit, promiscuity, and prostitution polyandry.

Chronobiology: the temporal organization of biological functions--we "hum with the pitch of our homeland" (Winfrey)--dawn is a cadence caller, a resetting stimulus.

"Deceit"--mimicry, camouflage, concealment; complex deceptive behaviors (higher primates); self-deceit?

Cooperation--endosymbiosis, colonies with or without genetically identical individuals, mutualisms, pollination and seed dispersal, cooperative breeding, reciprocal altruism, "peacemaking"--fine line between antagonism and cooperation.

Parental investment is the single most important difference between the sexes.

For the sex investing *more*, copulation is more "expensive;" this sex becomes the "limiting resource" for the opposite sex and can afford to be "choosy."

For the sex investing *less*, there is greater competition (for access to the opposite sex) and a greater variance in reproductive success.

These hypotheses have not been falsified, and more examples have been found to support them than to refute them.

For *fishes*, male parental care is more common than female parental care; for *amphibians*, males and females provide uniparental care with about equal frequency; for *reptiles*, uniparental care is more often provided by the female; for *birds*, biparental care is common; for *mammals*, intrauterine gestation and lactation guarantee that the female will usually invest more than the male, and in most mammalian species, the female provides the only care.

#3 HOMINID EVOLUTION: the feet led the way--bipedalism appeared 4 million years (my) ago, predating rapid neocortical expansion by 2 my---estrus became concealed.

Genetic predispositions in human behavior? How to approach?

- compare to behavior of other animals?
- large-scale surveys?
- identical twins reared apart?
- genes for behavioral traits?
- cross-cultural "universals?" (nuclear family, kinship loyalty, nepotism, incest taboos, gender role differences)
= other?

Male human nature and female human nature? (Donald Symons)

- visual arousal
- pornography
- qualities in male--age & physical beauty vs. status and possessions.
- emphasis on sexual variety vs. quality
- homosexual male partnerships compared to lesbian partnerships.

Tendency to dichotomize: members vs. nonmembers, friend vs. alien--innate? (E.O. Wilson)

Dichotomous thinking: nature/nurture, mind/body, diversity/uniformity

(of life).

Perceptual subjectivity--all sensory systems have descending pathways exerting centrifugal control over the end organ--perceptual shaping occurs at all levels of the neuraxis--yet the ongoing experience of any perception is committing (Robert Livingston)--perceptions are hypotheses (Richard Gregory).

Brain is a-logical and a-rational: cognition depends on comparing new perceptions to learned patterns; entrenched patterns contribute to a "tyranny of mental habit" (Howard Margolis).

DEFENSES--consider:

- repression--conceals feelings from self and others--our lies are all the more convincing to ourselves and others when we repress awareness of lying--Robert Trivers: the conventional view that natural selection favors nervous systems which produce even more accurate images of the world is a naive view.
- reaction formation--enhances deception?
- projection--displaces responsibility for a feeling.
- splitting--manipulates relationships.
- passive-aggressive behavior.
- intellectualization.
- identification with aggressor.
- sublimation.

Regression: signal of a need for aid? (Randolph Nesse).

Humor--turns loaded confrontation into play with greater chance for peaceful manipulation (Nesse)--what else does humor achieve? Stress reduction? Enhanced bonding and collaboration? Pleasure, fun (could pleasure be adaptive?)

For man, should "adaptive" mean more than survival and reproductive success?

Use of evolutionary insights in psychotherapeutic intervention:

when helpful? when harmful? Would clarification of innate proclivities be useful at times, and distracting or destructive at other times? Can such insight be abused?

Sociophysiology and sociobiology RG

Regular ASCAP readers know that one result of the publication of this informal newsletter was that editors of the sixth Comprehensive Textbook of Psychiatry (edited by H Kaplan and B Sadock, William and Wilkens) requested that the chapter on sociobiology (with a critical focus on its relevance for psychiatry and psychotherapy) be authored by ASCAP's editor, me. So I compliantly drafted such a chapter, entitled, "Sociobiology and Its Applications to Psychiatry" and submitted it to the editors who have suggested that some figures be added.

Previous editions had featured wildlife pictures in a counterpart chapter so I asked Greg G Dimijian, a widely published wildlife photographer as well as teacher of behavioral ecology to psychiatry residents (see feature p8) to furnish me two photos. He graciously sent candidate slides quickly. We selected two just before this went to press.

One is of two young male giraffes "necking"--which turns out to be practice for intrasexual competition using the powerful weapon that necks and heads together have become in giraffes: they use their necks as slings with the skull at the end as a momentum-producing weight. These are used not only against fellow males but even more devastatingly against other antagonists. Their neck-head club also seems to be an antipredator device, but Greg described that an unfortunate eland that got in the way was head-neck-clubbed fatally by an apparently bad tempered giraffe.

A more peaceable picture features an elephant family who are palpably

demonstrating familial bonding (the trunk of a subadult can be seen draped about a little one). This will illustrate a discussion of kin selection and inclusive fitness.

A draft of a third figure (composed by me) is on page 13. I solicit reader feedback on it. Are there terrible errors in it or in the narrative that it illustrates? Please let me know concerns immediately by telephone, fax, or return mail.

The diagram illustrates a sociophysiological model of the individual. One of the points made in the chapter is that psychiatry does not have a coherent biological basic science at present and that top-down and bottom-up strategies are needed to learn about how, within behaving individuals, the products of their genes are keyed to the doings of other individuals. Our efforts need to be aimed at learning more of communicative biology.

All presently acting genes are modifications of precursor genes that originated 3.5 billion years ago and that have been modified ever since. In a condensed way, the figure aims to explicate what is researched by investigative strategies at five levels as well as assumptions we make with respect to (A) cellular metabolism, (B) intercellular metabolism, (C) body maintenance, (D) family connectedness (kin selection including parental investment), and (E) species orientation (fundamentally mate selection but also realized more complexly with eusocial species, as illustrated by group behavior and Simon's docility).

To help explicate this idea of uniting sociobiological concepts with more physiological ones, I illustrate what kind of selection process went on/is going on, what the genes at the particular level can be inferred to do, how these layered genes can be diagrammatically represented, and what is done at each level to sustain

personal and genetic existence. Finally, psychiatric disturbances from problems arising from disturbances at each level are illustrated.

The chapter part that the figure mostly illustrates follows:

Beyond the black box premises and deductive methods of ultimate causation advocates, research on proximate mechanisms in the individual must be done for a subset of sociobiology labeled sociophysiology to be an adequate basic science of psychiatry. Among studies of proximate causation, bottom-up and top-down research can be distinguished. In bottom-up research, cellular-molecular studies bear on the behaviors of whole organisms similar to the way that a low antidepressant blood level may explain a treatment nonresponse. In top-down work, information from whole organism behaviors predicts molecular data, like polyphagia, polydipsia and polyuria predict hyperglycemia and hypoinsulinemia, part of the pathogenesis of diabetes mellitus. In contrast to this disease, most psychiatric diagnoses, however, have provided few molecular clues. Yet such clues to pathogenesis are a legitimate objective of sociobiological science and should preoccupy it in the future.

Fundamentally, conspecifics communicate with one another on cognitive and non-cognitive levels in order to link with, or distance from, one another spatially and over time. Strategies evolving over evolutionary time represent the present day action of basic biological plans that have originated early and then endured. Eating, defense, sex and parenting may represent such basic plans, each with distinctive add-on components.

Eating is so significant an animal activity that it probably has not re-evolved over evolutionary time like flying did, but the details of what is eaten, and how, vary markedly. Foraging mechanisms often involve conspecific communication in ways that are highly specialized. For example, in rats the odor caused by what a fellow rat has recently ingested has major influence on the smeller rat; what the other rat ate becomes preferred food. On an evolutionary basis, this may have evolved to avoid poison while yet eating what is available, ie, a fellow rat alive enough to emit the odor may assure safety for that food. Humans have undergone quite separate counterpart oral evolutions. For example, they tell stories that may serve as guides to the future actions of the hearers. Such oral activities can be viewed as derivative of genes that

program the mouth, lungs and laryngeal apparatus.

As is well known from flight-fight reactions, defensive behaviors also reflect basic plans. Panic and anxiety disorders may reflect unduly triggered human variants. Indeed, many psychiatric disorders may represent activation of basic patterns of reactivity that to outside observation are inappropriate to the context.

For another basic plan, sex, identification of conspecifics that are potential mates seems to have stemmed fundamentally from the adaptation which sexual reproduction provided. Mixing of genes to stay ahead of mutating microorganisms may have reinforced this. Species that resort to parthenogenesis tend to be short-lived as distinct entities. On the proximate level of analysis, reproductive and other sexual hormones have figured in the mechanics of sexual proliferation as they are homologous factors in many species with varied ancestries; sex hormones are the result of very basic plans and are constituent basic parts. Sexual biology of course has involved communication, eg, testosterone causes a deeper voice.

In work bearing on prevention of deleterious genetic consequences from inbreeding, evidence exists for incest taboos in many species other than humans and they probably exist in humans as well, not so much a result of the Oedipal complex, but antedating it in the infant's life. Familial bonding seems to pre-empt sexual bonding later, based evidently on early contact rather than genetic relatedness, ie, unrelated children growing up together in the kibbutz behave as though they were siblings without later interest in mating. Only when familial bonding is disrupted do evidences of more sexual bonding occur. Oedipal temptations probably happen only when pre-Oedipal bonding has been disrupted.

Although not unique to them, mammals are highly invested in their offspring. Human babies are attention-getters and illustrate that genetic predispositions interact with the environment to heighten adaptation. Cries and smiles are aimed at adults who of course have somatic and behavioral responsivity to such stimuli, eg, pupils enlarge and interest heightens on perceiving infants, even if unrelated to the perceiver. In human neonates, there seems to be a preprogrammed interest for adult facial expressions. Observers without knowledge of a specific stimulus can tell from a baby's imitative reaction whether a stimulus face was smiling or frowning.

Figure. Sociophysiological model of the individual

- A.
 - B.
 - C.
 - D.
 - E. Cell
 - 1. Cell division and metabolism
 - 2. Natural selection (NS)/unicellular
 - 3. Basic "housekeeping" genes
 - 4. ((((((EEEE)))))) E = core genes
 - 5. All cells have common elements
 - 6. Lesch-Nyhan mental retardation
- D. Body
 - 1. Cell adhesion, nutrition & maintenance
 - 2. NS/early multicellular life stages
 - 3. Basic genes (BG)+intercell add-ons (IA)
 - 4. (((((DEEEED)))))) D = cell specialty genes
 - 5. Oral cells: epithelial, neural, muscle
 - 6. Delirium from electrolyte abnormality
- C. Individual
 - 1. Body integrity: food & security
 - 2. NS/obligate multicellular stages
 - 3. BG+IA+add-on genes for body integrity (BI)
 - 4. (((CDEEEEDC))) C = food intake + protection genes
 - 5. Biting occurs for eating and defense
 - 6. Panic disorder, anorexia nervosa
- B. Family
 - 1. Gene perpetuation: bonding, gamete production, direct parenting, sibling cooperation/competition
 - 2. NS + Kin selection for inclusive fitness/group living
 - 3. BG+IA+BI+ add-on genes for familial bonding (FB)
 - 4. ((BCDEEEEDCB)) B = genes for kin detection/bonding
 - 5. To bond, mother and infant both laugh, using mouth
 - 6. Infantile autism, child abuse
- A. Species
 - 1. Gene enhancement: selection of best mate available; parental investment; conspecific groups for feeding, defense, and reproduction; social rank hierarchies
 - 2. NS + Sexual selection for best genes/group living
 - 3. BG+IA+BI+FB+ add-ons for mate selection + group behavior
 - 4. (ABCDEEEEDCBA) A = genes for mate selection devices
 - 5. Males sing (orally) and female smiles at choicest male
 - 6. Manic patients are hypersexual and over-assume control

Figure legend: A - E: Levels of investigation; 1. Organism functions at each level; 2. Kind of evolutionary selection/era when evolved; 3. Basic plan schemata with new contributions at each level; 4. Speculative diagram of responsible gene/gene complexes; 5. Examples of gene-determined mouth-functions at each level; 6. Psychiatric illness from dysfunction at each level. The five levels of investigation can be related to any one of the others, via top-down (e.g., A/B with C/D or E), bottom-up (e.g., E or D with A/B), or mixed approaches.

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2. c/o R Gardner, 1.200 Graves Building (D29), University of Texas Medical Branch, Galveston, TX 77550 FAX: 409-772-4288. For ASCAP Newsletter Volume 4 (Jan through Dec, 1991) please send \$18 (or equivalent) for the 12 issues. For subscription to the ASCAP Newsletter, make checks or money orders out to "Department of Psychiatry and Behavioral Sciences, UTMB."

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At this time this "informal" organization has no official budget.

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