THE FOUR CENTRAL QUESTIONS OF BIOLOGICAL RESEARCH USING ETHOLOGY AS AN EXAMPLE

	Questions Concerning Proximate Causes		**Questions Concerning Ultimate Causes**		
	(1) Causation	**(2) Ontogeny**	**(3) Adaptation** *(a: ecological, b: intraspecific)*		**(4) Phylogeny**
A) Examples of ethological inquiry and associated disciplines	**● How do behavior and psyche "function" on the molecular, physiological, neuroethological, cognitive and social level** - and ● what do the relations between the levels look like? ● How are biologically preprogrammed (hereditary) behavior patterns (e.g. 'instinctive' drives and inhibitions), learning, intellect and culture, as well as ability, volition and conscience entwined with one another and ● are there differences dependent on the species, age, gender and behavioral realm? ● How do perception, subjective internal mentation and behavior correspond with the environment?	**● Which developmental steps and which environmental factors play when / which role?** I.e.: ● What are the ontogenetic bases of behavior and learning? E.g.: Which effect have ● hormones and ● reafferences for ● maturing processes and ● imprinting-like steps? ● How are instincts and learning intertwined with one another? ● What is learned?	**● How do specific faculties of perception, subjective internal mentation, learning and behavior benefit the performer?** E.g.: ● Which evolutionary alterations occurred in persistent phylogenetically earlier traits, caused by the selective pressure of more recent behavior patterns? What are the costs, what the benefit of a behavior pattern - for example *(a) ecological* ● concerning caloric intake and energy expended?	*(b) within the species* ● in relation to familial proximity and ● social attractiveness?	**● Why did structural associations evolve in this manner and not otherwise?** Specifically: ● Which behavior was a prerequisite of which new form? ● What consequences do older traits have for further developments - e.g. for ● synergy and antagonism in hormones and transmitters, ● neuro-anatomical structures and ● behavioral traits? (space-time-struct.) ● Which traits are homologous, which analogous?
B) Examples of behavior	● Endorphine levels rise during grooming in enactor and recipient. ● Expression: emotion - enactor - recipient relations. ● Friendly behavior patterns are adversaries of aggression, they can be furthered culturally. Unattractive behavior patterns such as wanton aggression can be culturally inhibited.	● Children recognize themselves in a mirror at 20 months of age. This is one of the foundations of social cognition, for example being able to put oneself in another's perspective as a prerequisite for cognitive altruism and cooperation.	Social bonding is advantageous for ● protection against predators, ● collective hunting, ● building larger structures.	● Friendly behavior helps to develop and maintain bonds as a basis for reciprocal support, e.g. during brood provisioning and aggressive interactions.	● Brood provisioning and mother-child bond were phylogenetic preconditions for social bonds. Within this development in addition to their original function, elements of brood behavior became elements of social behavior, e.g. kissing & billing and grooming & preening.
C) Level of inquiry (e.g.: atom, molecule, cell, tissue, organ, individual, group, society) **with examples of scientific disciplines**	**atom, molecule:** Biochemistry, **cell, tissue, organ:** Neurophysiology, Neurobiology, **organ, individual:** Neuroethology, Neuropsychology, Neurology, Behavioral Physiology, B. Endocrinology, B. Genetics, B. Immunology, Chronobiology, Psychiatry, Psychosomatology, **individual, group:** Ethology, Sociobiology, Behavioral Ecology, Psychology, Psychotherapeutic Theories, Pedagogy, Earliest History, **society:** Sociology, Law, Political Science, Economics, History, Cultural Sciences, Arts.	**organ, individual:** Developmental Neurology, Neurobiology, **individual, group:** Ethology, Developmental Psychology, Psychotherapeutic Theories..	**individual, group:** Ethology, Behavioral Ecology, Socio-Ecology.	**individual, group:** Ethology, Sociobiology.	**cell, tissue, organ:** Neurobiology **individual, group:** Ethology.

Behavior and the psyche cannot be understood from the point of view of a single focus of inquiry since the areas in questions are, in reality, closely intertwined with one another. When certain scientific relationships are not considered, (established) knowledge is neglected (see paragraph C, cf. columns 1 - 4). The **"Theory of Human Sciences"** is a framework of reference, which demonstrates the associations between disciplines. The framework has a simple basic structure: It becomes clear when, based on the matrix with the four **central questions** of biological research *(causation, ontogeny,* adaptation, phylogeny), one asks and at the same time takes the **reference levels** (e.g. cell, organ, *individual, group)* at which the questions are aimed into account.

The first three bold-type lines of paragraph A, columns 1 - 4 are mutatis mutandis also applicable to biological sciences, psychology and social and cultural sciences.

The four Central Questions are based upon Darwin e.g. 1859, 1871; Lorenz e.g. 1937, 1957; Tinbergen e.g. 1951, 1963; C1: strata after Hartmann 1964, Lorenz 1977; C1: association of disciplines after Riedl e.g. 1984; behavioral examples: B1: example 1: Panksepp e.g. 1981; example 2: Wickler e.g. 1970; Leyhausen e.g. 1967; example 3: Lorenz 1966; Eibl-Eibesfeldt e.g. 1990; Ridley 1997; B2: Bischof-Köhler 1989; B3a: e.g. Krebs & Davies 1981, Dunbar 1988; B3b: Hamilton, 1964; Eibl-Eibesfeldt e.g.1972; Goodall 1986; Frank 1988; de Waal 1996; B4: Eibl-Eibesfeldt e.g. 1972; Tab. after Medicus 1995, 2005.