

AQUATIC ANIMAL WELFARE IN U.S FISH CULTURE

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Animal Rights

People for the Ethical Treatment of Animals (PETA)



<http://www.animalactivist.com/>

Animal Rights & Animal Welfare

Animal Rights: A philosophy that animals have the same rights as people.

Objective: to end the use of animals as companions and pets, and in extreme cases, opposition to the use of animals for food, fiber, entertainment and medical research.

Animal Welfare: Concern for the well-being of individual animals, unrelated to the perceived rights of the animal or the ecological dynamics of the species.

The position usually focuses on the morality of human action (or inaction), as opposed to making deeper political or philosophical claims about the status of animals

Fish Welfare: A challenge to the feeling-based approach, with implications to recreational fisheries

Table 1 Implications of animal welfare, animal liberation and animal rights concepts for the socially accepted interaction of humans with fish.

Criteria	Animal welfare	Animal liberation	Animal rights
Fish have intrinsic value	Yes/No	No	Yes
Fish have rights	No	No	Yes
Duties towards fish	Yes	Yes	Yes
Catch, kill and eat	Yes	No	No
Regulatory catch-and-release	Yes	No	No
Voluntary catch-and-release	Yes	No	No
Recreational fishing	Yes	No	No
Fishery management	Yes	No	No
Use of animals (food, work, manufacture, recreation and science)	Yes	No	No

Robert Arlinghaus, Steven J. Cooke, Alexander Schwab & Ian G. Cowx. Fish and Fisheries, 2007, 8, 57-71. (Ghoti Paper)

Recreational Fisheries Concerns & Mitigation

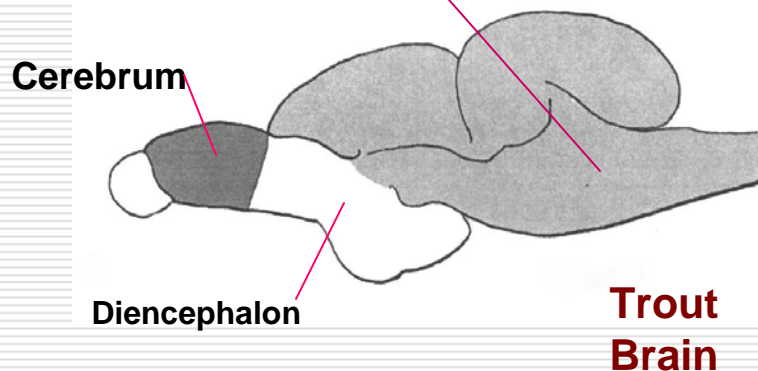
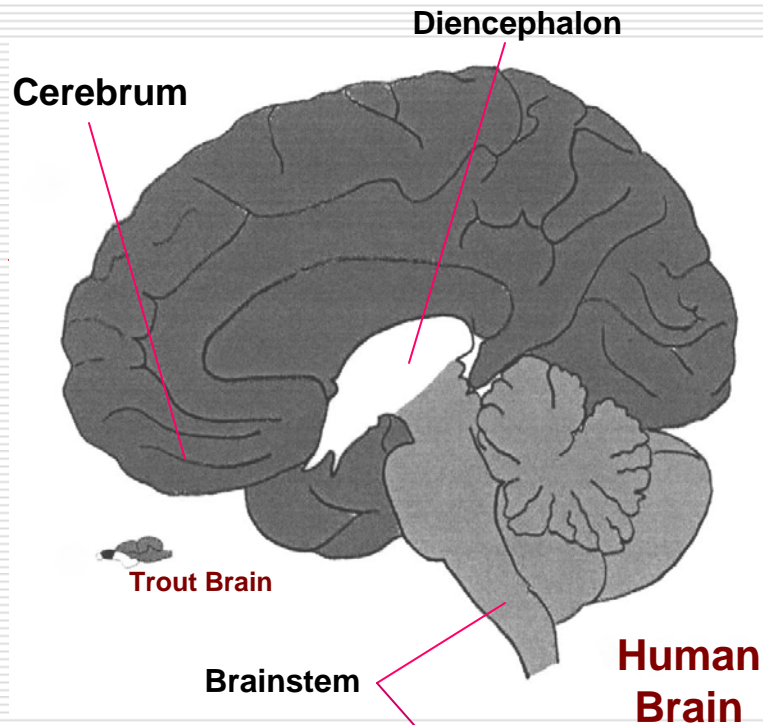
Cooke, S. J. and L. U. Sneddon. 2006. Animal welfare perspectives on recreational angling. Applied Animal Behavioral Science. 104: (3-4) 176-190. (MODIFIED)

Regulations or Guidelines

Number of Jurisdictions

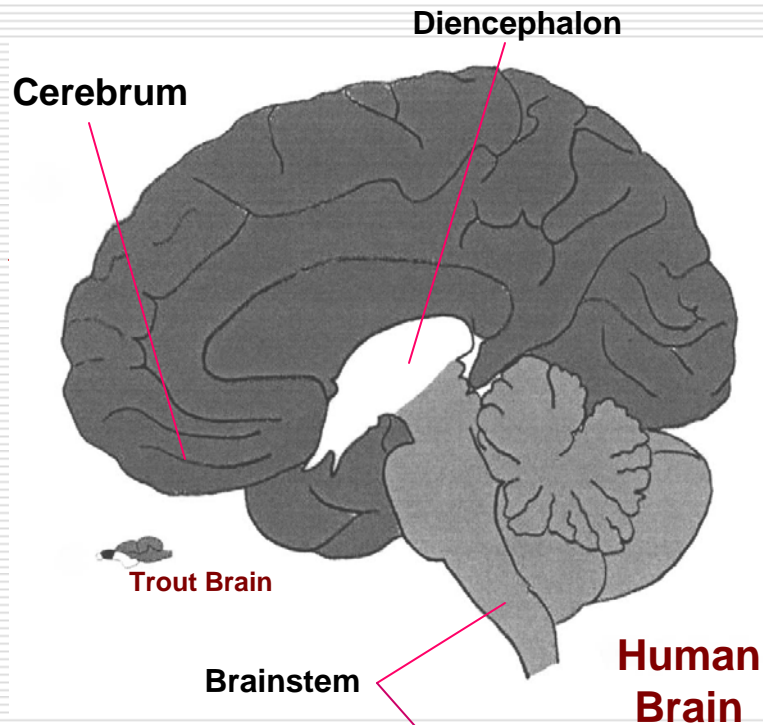
Barbless Hooks (Mandated or Recommended)	19 (Species and Areas)
Cut Line If Deeply Hooked (Recommended)	13
Avoid Contact with Eyes or Gills (Recommended)	12
Play Fish Minimally (Recommended)	11
Keep Fish in Water (Recommended)	14
Keep Injured Fish if Legal	5
Use Knotless Nets (Recommended)	4
Stringers Prohibited (Recommended)	3
Raise Fish Slowly From Depth (Recommended)	2
Risk of Fishing at Warm Temperatures (General Information)	2

Canadian Selected Recommendations, Mandates, or Recommendations



Rose, J.D. 2002. The neurobehavioral nature of fishes and the question of awareness and pain. *Rev. in Fisheries Sci.* 10(1):1-38.

- (1) behavioral responses to noxious stimuli are separate from the psychological experience of pain,
- (2) awareness of pain in humans depends on functions of specific regions of cerebral cortex, and
- (3) fishes lack these essential brain regions or any functional equivalent, making it untenable that they can experience pain.

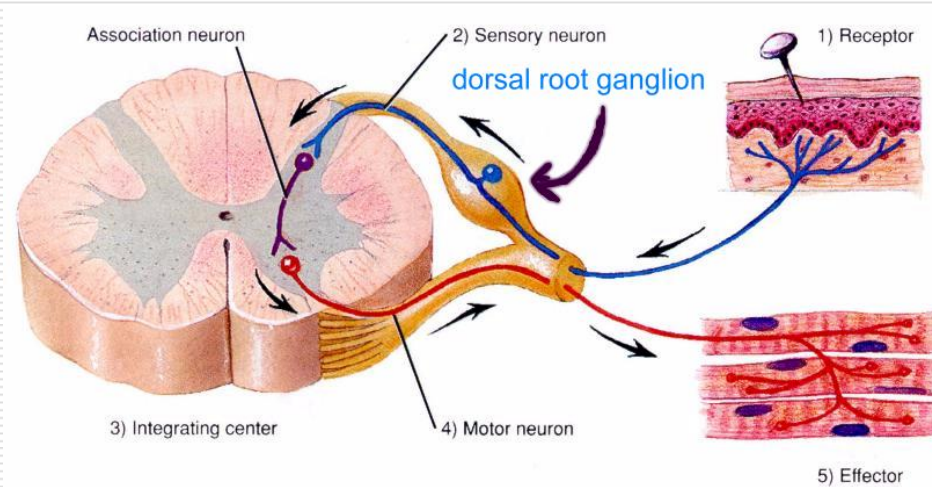


Rose, J.D. 2002. The neurobehavioral nature of fishes and the question of awareness and pain. *Rev. in Fisheries Sci.* 10(1):1-38.

“Because the experience of fear, similar to pain, depends on cerebral cortical structures that are absent from fish brains, it is concluded that awareness of fear is impossible for fishes.

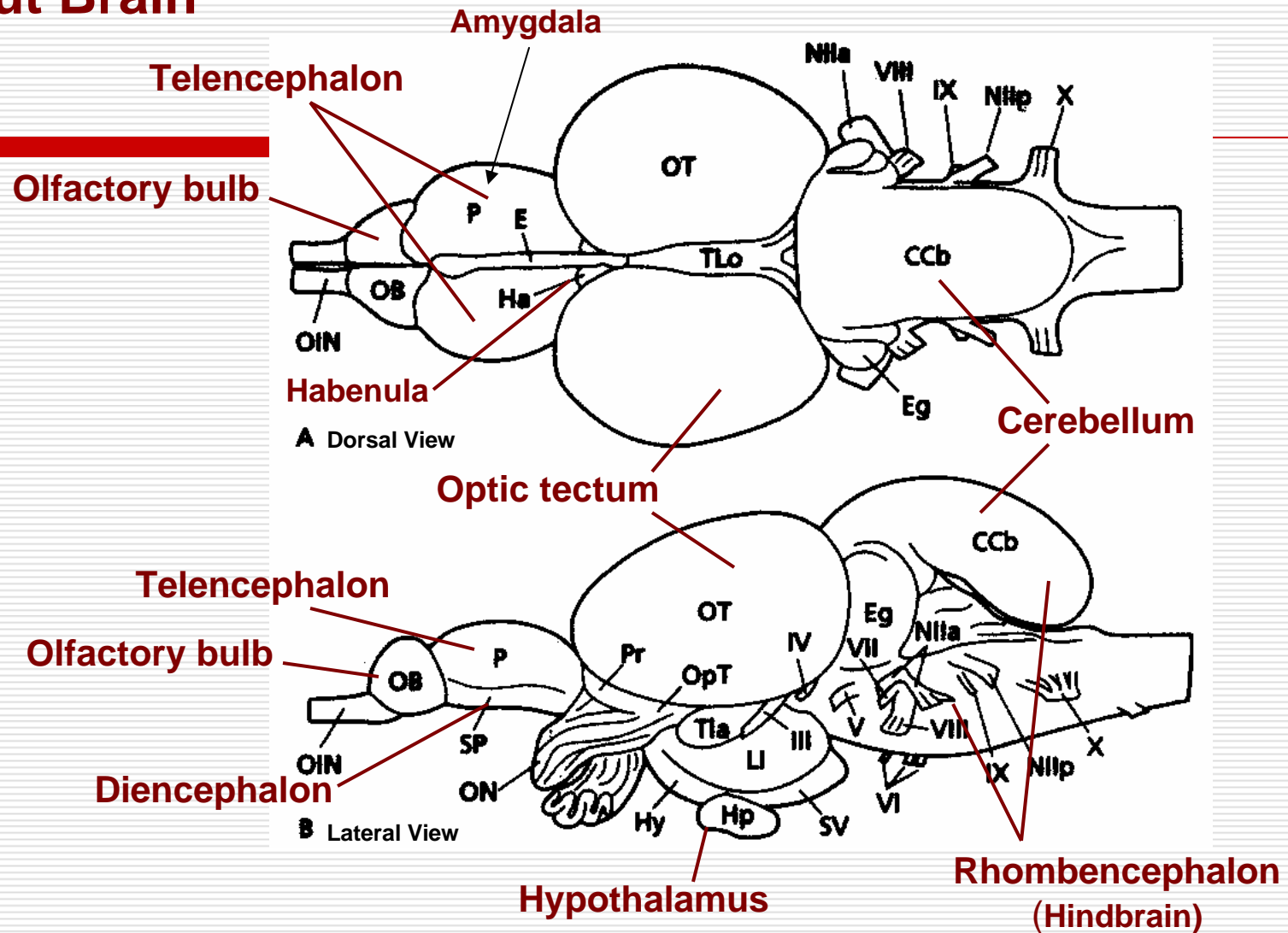
... it is implausible that fishes can experience pain or emotions, they display robust, nonconscious, neuroendocrine, and physiological stress responses to noxious stimuli”.

ROSE'S POSITION: THAT THE ELEMENTS OF THE BRAIN AND ANY INTERPERATIVE FUNCTIONS OF PAIN AND DISTRESS ARE NOT INVOLVED OR PLAUSABLE



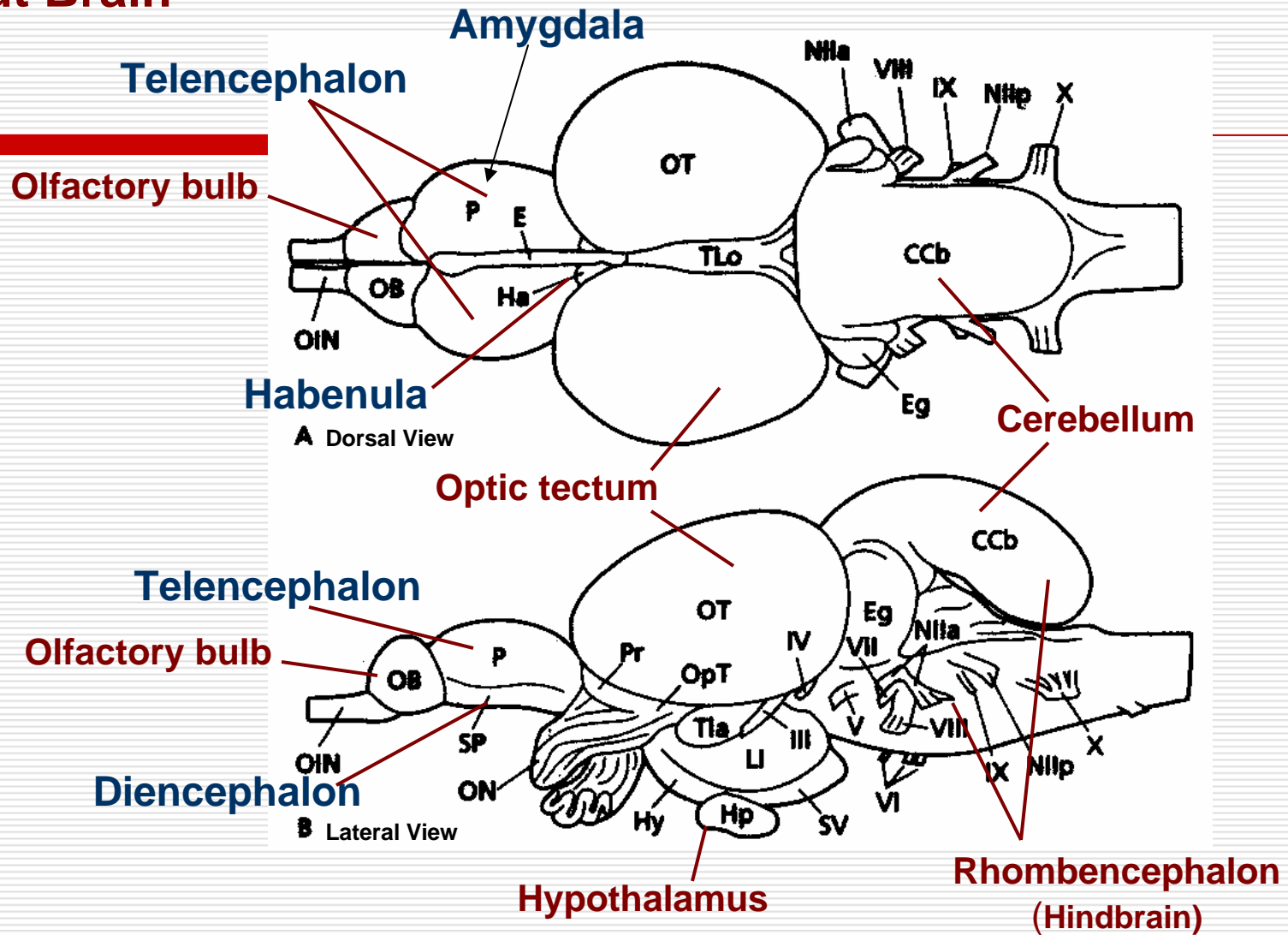
“... they display robust, nonconscious, neuroendocrine, and physiological stress responses to noxious stimuli”.

Trout Brain



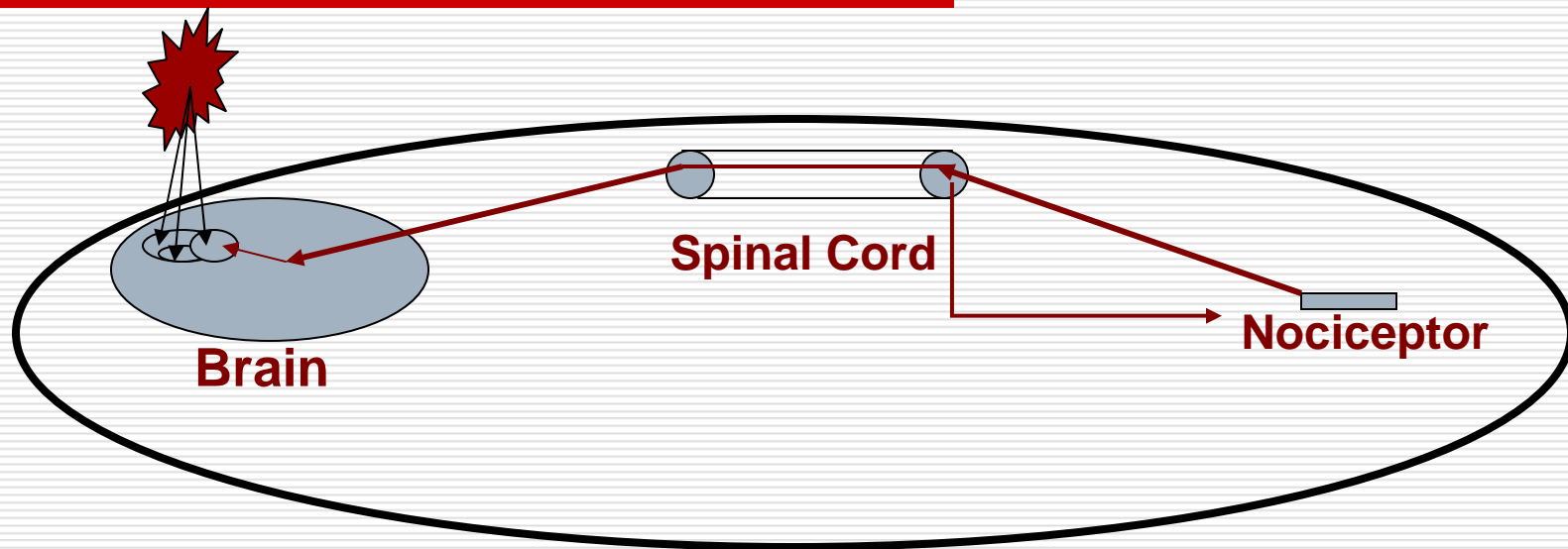
Modified from: Ostrander, G.K., (Ed). 2000. The Laboratory Fish

Trout Brain



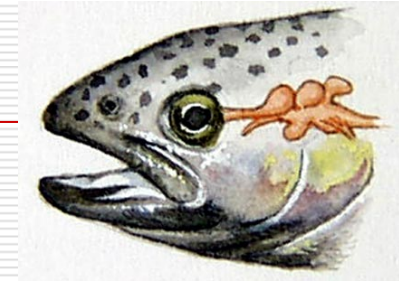
Modified from: Ostrander, G.K., (Ed). 2000. The Laboratory Fish

PATHWAYS FOR NOCUOUS STIMULI AND HYPOTHETICAL CENTERS OF INTERPRETATION



EVOLUTION OF PROGRESS

Summary: Neuroanatomy



Fish are capable of nociception.

Do not possess a neocortex which some believe is solely responsible and required for consciousness.

Possible through homologous structures or several structures acting in concert, that fish experience some form of conscious pain.

No final, definitive studies to determine if fish possess the neuroanatomy necessary to consciously perceive pain.

Advanced imaging and molecular techniques may allow visually identification of changes in the fish brain in response to noxious stimuli.

Investigation of Van Gogh-like 2 mRNA regulation and localisation in response to nociception in the brain of adult common carp (*Cyprinus carpio*) Neuroscience Letters. 465(3):290-294 2009

Siobhan C. Reilly, Anja Kipar, David J. Hughes, John P. Quinn, Andrew R. Cossins & Lynne U. Sneddon. Neuroscience Letters

The encoded protein of the Van Gogh-like 2 (vangl2) gene is a transmembrane protein and is highly conserved through evolution.

The gene was expressed in all brain regions, and particularly intensely in neurons of the telencephalon and in ependymal cells.

This regulation opens the possibility that Vangl2 is involved in nociceptive processing in the adult fish brain and may be a novel target for central nociception in vertebrates.

RESEARCH AREAS IN ANIMAL WELFARE

Chandaroo, K.P., I.J.H. Duncan and R.D. Moccia. 2004. Can fish suffer?: Perspectives on sentience, pain, fear and stress. Applied Animal Behaviour Science. 86: 225-250.

Cognitive abilities and Sentient Animals

Motivational Affective States

Limbic System

Dopaminergic Systems

Pain and telencephalon

Peripheral Detection of Noxious Stimuli: Nociceptors

Central integration of nociceptive signals:

Spinal pathways

Central integration of nociceptive signals:

Biochemical mediation

Nociception, the Telencephalon and Pain Perception

Fear and Anxiety

Physiological Aspects of Stress

Browman HI, Skiftesvik AB. INTRODUCTION: Moral, ethical and scientific aspects of welfare in aquatic organisms

Bekoff M. Aquatic animals, cognitive ethology, and ethics: questions about sentience and other troubling issues that lurk in turbid water

Broom DM. Cognitive ability and sentience: Which aquatic animals should be protected?

Lund V, Mejdell CM, Röcklinsberg H, Anthony R, Håstein T. Expanding the moral circle: farmed fish as objects of moral concern

Mather JA, Anderson RC. Ethics and invertebrates: a cephalopod perspective

Braithwaite VA, Boulcott P. Pain perception, aversion and fear in fish

Rose JD. Anthropomorphism and 'mental welfare' of fishes

Iwama GK. The welfare of fish

Bergh Ø. The dual myths of the healthy wild fish and the unhealthy farmed fish

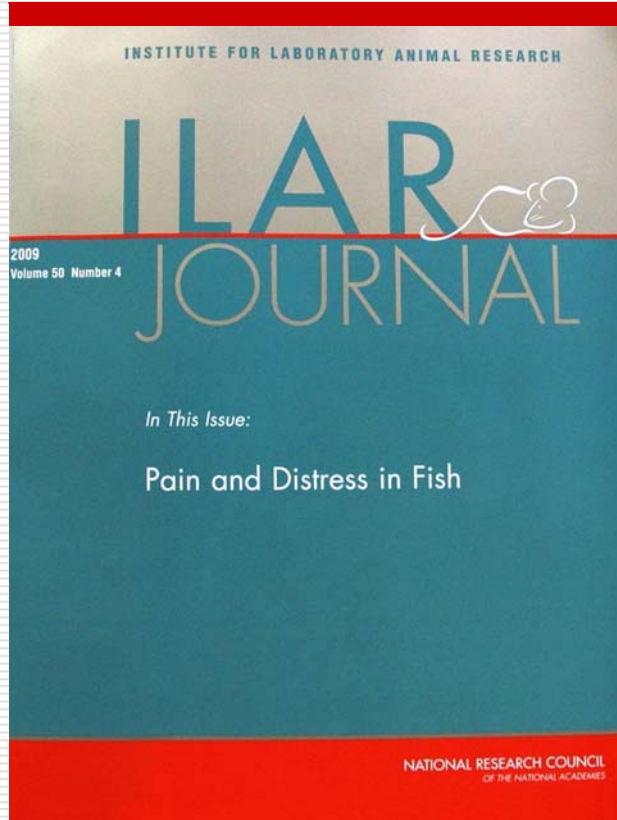
Volpato GL, Gonçalves-de-Freitas E, Fernandes-de-Castilho M. Insights into the concept of fish welfare

Turnbull JF, Kadri S. Safeguarding the many guises of farmed fish welfare

Special 2: Welfare of Aquatic Organisms. May 2007.
<http://www.int-res.com/abstracts/dao/v75/n2/>

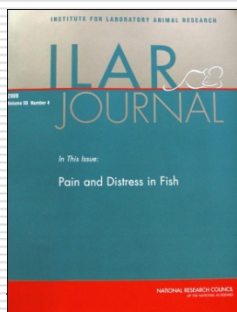
Institute for Laboratory Animal Research 2009. Vol. 50, No. 4.

Independent Advisor to the Federal Government, Biomedical Research Community and the General Public



- **Posner, L., DVM**
- **Volpato, G., PhD**
- **Sneddon, L., PhD**
- **Neff, D., DMV & A. Stamper, DVM**
- **Hitschfeld, E., S. Stamper, K. Vonderschen, E. Fortune, PhD & M. Chacron, PhD**
- **Gonzalez-Nunez, V., PhD & R. Rodriguez, PhD**
- **Harper, C., DVM & J. Wolf, DVM**
- **Smith, S., DVM, PhD & L. Noll**

Patronage: National Research Council, National Academy of Science



Institute for Laboratory Animal Research 2009. Vol. 50, No. 4.

- **Posner, L.** Pain and distress in fish: A review of the evidence
 - **Volpato, G.** Challenges in assessing fish welfare
 - **Sneddon, L.** Pain perception in fish: Indicators and endpoints
 - **Neff, D. & A. Stamper.** Fish sedation, analgesia, anesthesia and euthanasia
 - **Hitschfeld, E., S. Stamper, K. Vonderschen, E. Fortune, & M. Chacron.** Effects of restraint and immobilization on electrosensory behaviors of weakly electric fish
 - **Gonzalez-Nunez, V. & R. Rodriguez.** The zebrafish: A model to study the endogenous mechanisms of pain
 - **Harper, C. & J. Wolf.** Morphological effects of the stress response in fish
 - **Smith, S. & L. Noll.** Testing the waters: IACUC issues associated with fish
-

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Posner in her introductory remarks makes comments that are at odds with objective, scientific conclusion covering the subject.

“The fact that ILAR Journal has chosen to dedicate an entire issue to Pain and Distress in fish suggests that growing acceptance in the scientific community that fish neural anatomy and behavioral responses reveal that these animals feel pain and can also experience distress.

It is likely that humans will never fully know the extent that fish feel pain, but acknowledge that they do raises the likelihood that fish will receive the humane treatment increasingly provided to higher vertebrates.” (Posner, 2009)

It would be better stated as by Duncan, ... that, ***“there is enough evidence to justify giving the fish the benefit of the doubt.”*** More definitive evidence is still to be reported, but the evidence is strong enough to put a welfare status on fish. (Conte, NWFCC, 2009)

Institute for Laboratory Animal Research 2009. Vol. 50, No. 4.

Volpato in his paper: *Challenges in Assessing Fish Welfare*, states two positions that are what I believe to be beyond the scope of ILAR .

Aquarium: *“Nevertheless, the fish are confined and the question may be whether the recreational needs justify confinement.”*

Recreational Fishing: *“In short, recreational fishing is based mainly on a lack of facts rather than any compelling information or arguments. For all these reasons, fishing for recreation should cease*”

“The imposition of discomfort in activities solely for human pleasure (e.g. recreational fishing and aquarism) is unacceptable.”

AQUATIC ANIMAL WELFARE

MARKET DRIVEN

- The ultimate reaction and final decisions of growers will be relative to markets; if not driven by social concern, they will be driven by economics.
- The ultimate decisions of culture protocols to be used or adopted will be influenced by market response driven by public perception, attitude and expressed through consumer spending.

Conte, 2002; 2003; 2004; 2005

CURRENT POSITIONS

Definitive proof that fish are capable of experiencing pain has not been demonstrated, and may remain difficult to prove

If not pain as defined by the “human model”, fish may experience an analogous sensation similar to mammalian pain

Fish have the same basic anatomical and biochemical mechanisms that transmit nocuous stimuli to the brain, but it is the final interpretive centers that lack identification

A growing consensus among scientists working in these areas is that there is enough physical and behavioral evidence that the fish should be given the benefit of the doubt

There is growing consensus among much of the international community that market pressures will drive animal production industries towards greater consideration for animal welfare

ADDITIONAL REFERENCES

Ashley, P.J., L. Sneddon, C. R. McCrohan. 2006. Properties of corneal receptors in a teleost fish. *Neuroscience Letters*, 410(3):165-168

Siobhan, C.R., J.P. Quinn, A.R. Cossins, and L. Sneddon. 2008. Novel candidate genes identified in the brain during nociception in common carp (*Cyprinus carpio*) and rainbow trout (*Oncorhynchus mykiss*). *Neuroscience Letters*, 437(2):135-138

Siobhan, C.R., A. Kipar, D.J. Hughes, J.P. Quinn, A.R. Cossins, L.U. Sneddon. 2009. Investigation of Van Gogh-like 2 mRNA regulation and localisation in response to nociception in the brain of adult common carp (*Cyprinus carpio*). *Neuroscience Letters*, 465(3):290-294.

Sneddon, L.U. 2002. Anatomical and electrophysiological analysis of the trigeminal nerve in a teleost fish, *Oncorhynchus mykiss*. *Neuroscience Letters*, 319(3):167-171.

