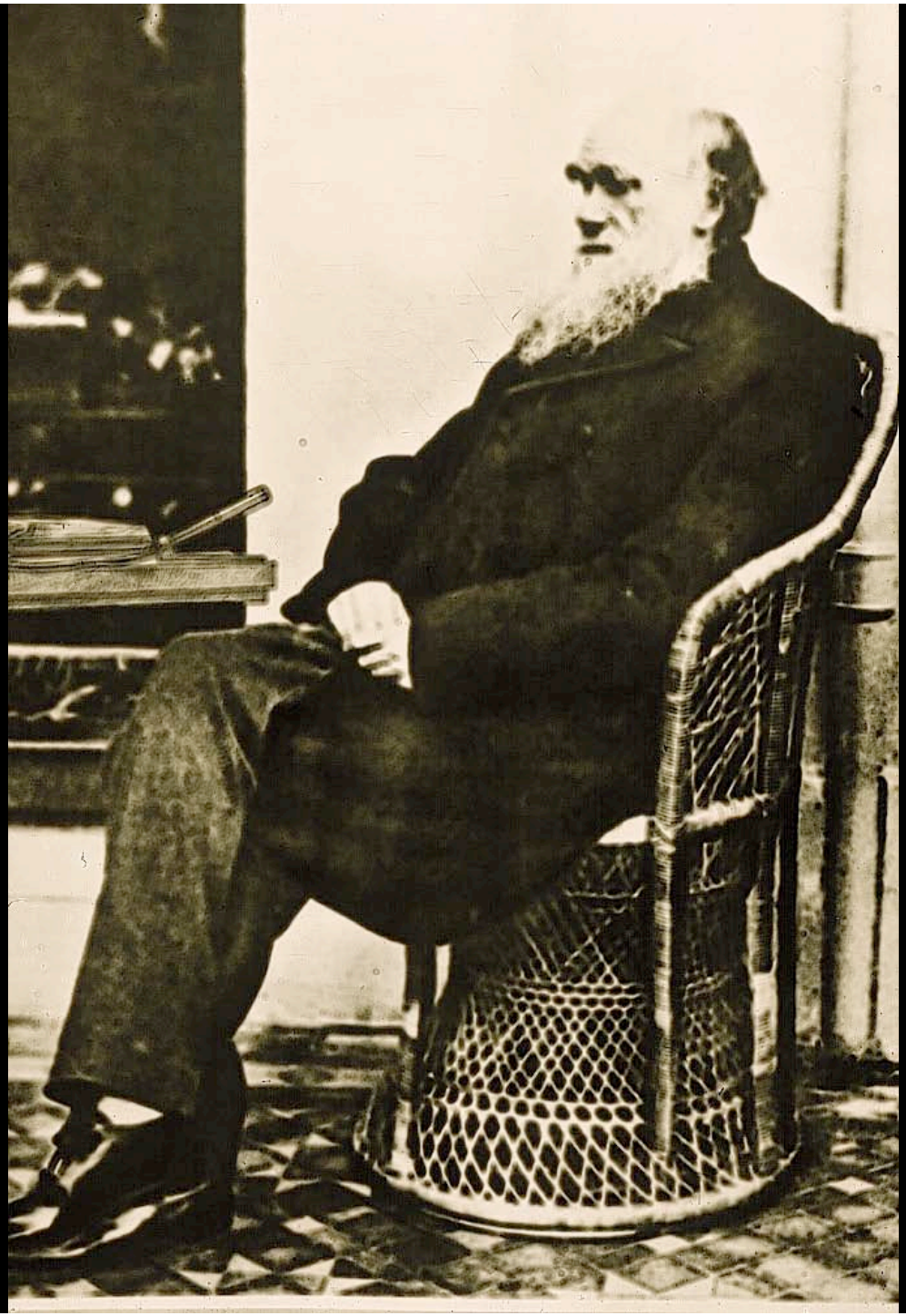
“How can we scientifically justify the use of animals in biomedical experimentation?”



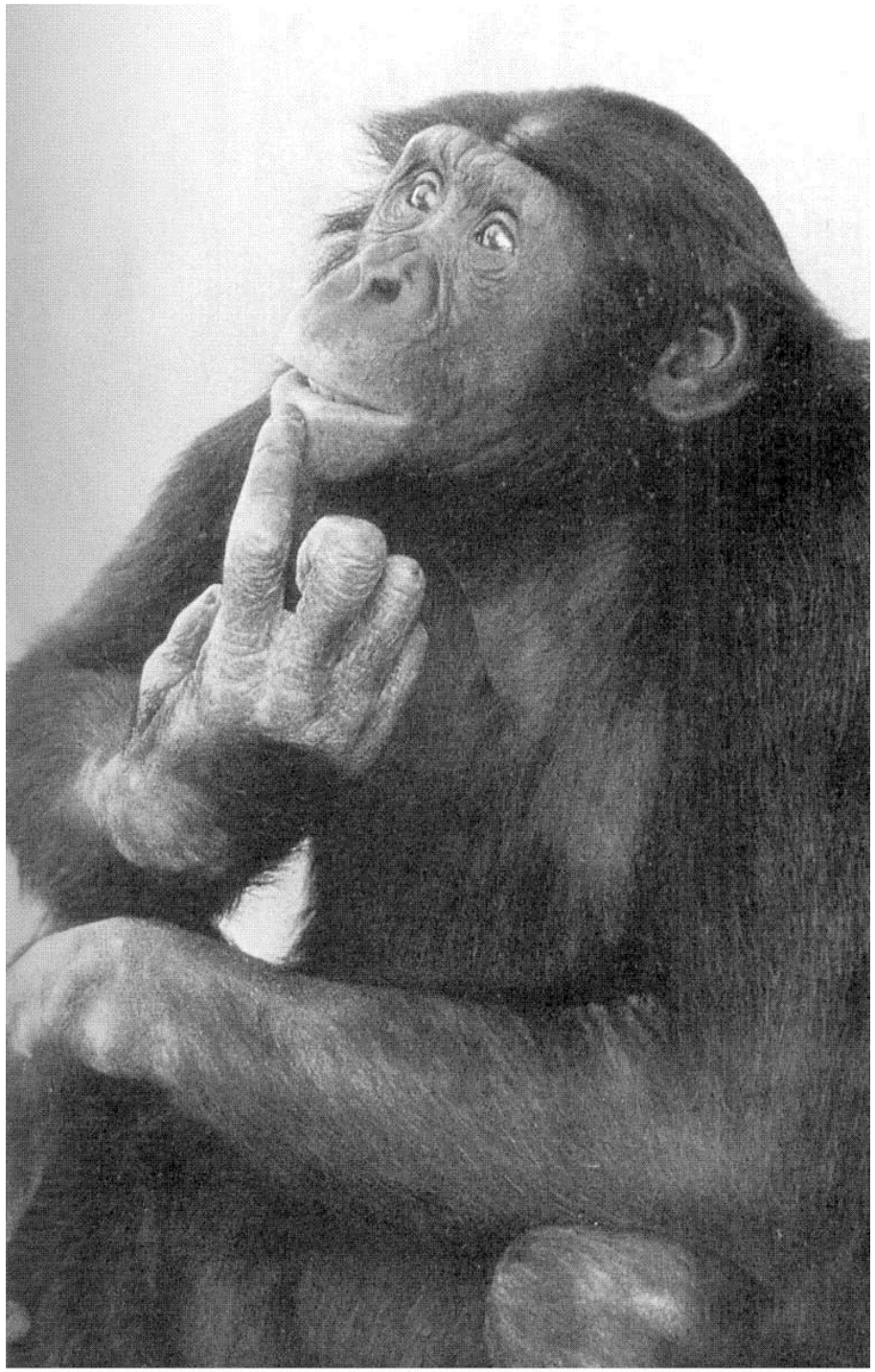
Aplysia californica

Rodents

Mice and Rats

Ethical aspects

Is it morally justifiable
to use animals in biomedical
experimentation?

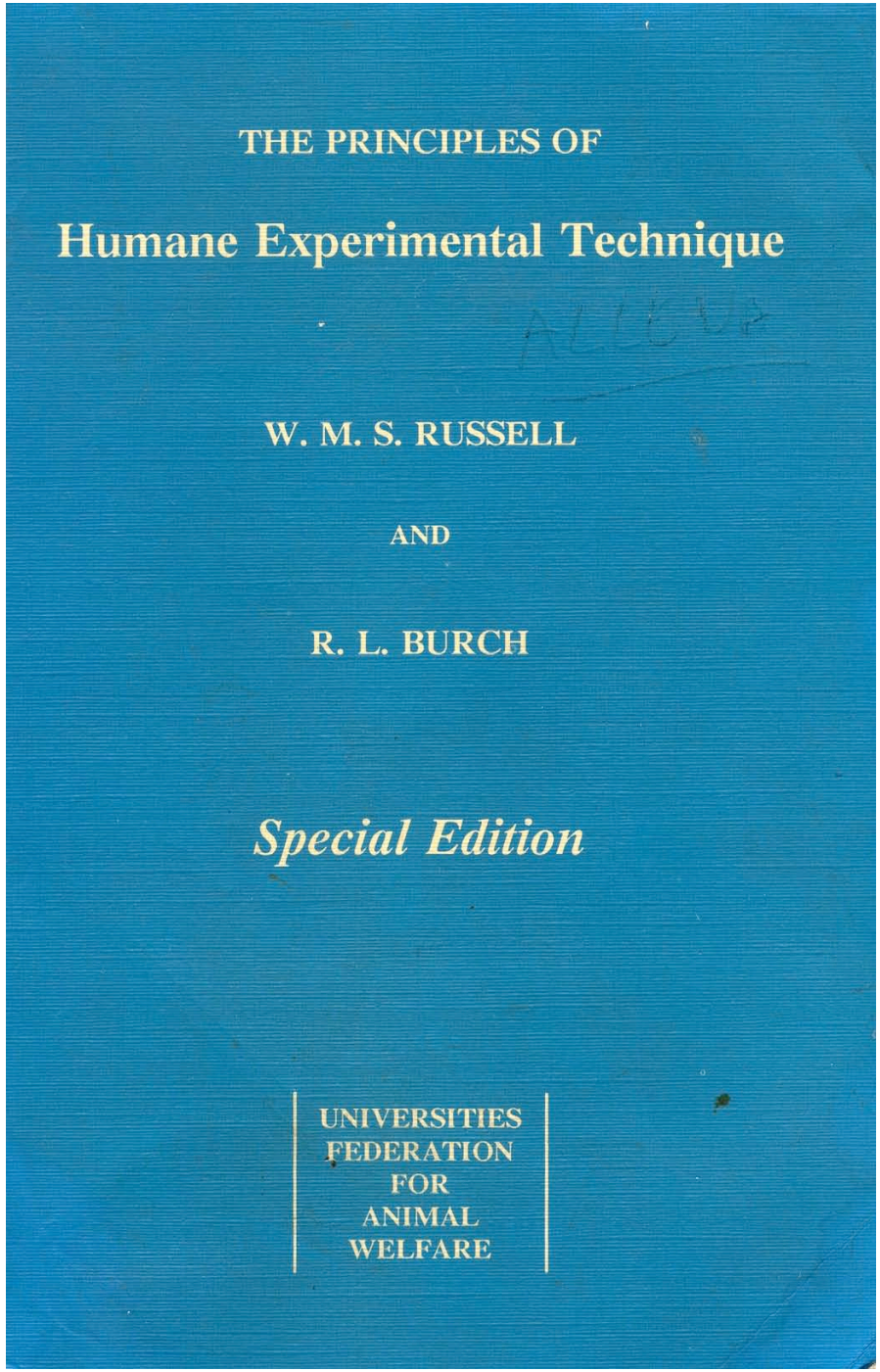


Experiments on humans?

Have animals a moral value?

- To abolish experiments on animals

- To reform experiments on animals



THE PRINCIPLES OF HUMANE EXPERIMENTAL TECHNIQUE

W.M.S. Russell and ***R.L. Burch***

Methuen & Co. Ltd (1959)

The "*3Rs*" Model

- ✓ *Replacement*
- ✓ *Reduction*
- ✓ *Refinement*

W.M.S. Russell and R.L. Burch (1959), *The principles of humane experimental technique*

Refinement is defined as:

"simply to reduce to an absolute minimum the amount of stress imposed on those animals that are still used"

From: W.M.S. Russell and R.L. Burch (1959), *The principles of humane experimental technique*

"Any approach which avoids, alleviates or minimises the actual or potential pain, distress and other adverse effects suffered at any time during the life of the animals involved, or which enhances their wellbeing as far as possible"

From: H.M. Buchanan-Smith *et al*. (2005); Animal Welfare, 14: 379-384

EUROPEAN DIRECTIVE 86/609/EEC

24 November 1986

Article 7

2. An experiment shall not be performed if another scientifically satisfactory method of obtaining the result sought, not entailing the use of an animal, is reasonably and practicably available

3. When an experiment has to be performed, the choice of species shall be carefully considered and, where necessary, explained to the authority. In a choice between experiments, those which use the minimum number of animals, involve animals with the lowest degree of neurophysiological sensitivity, cause the least pain, suffering, distress or lasting harm and which are most likely to provide satisfactory results should be selected [...]

4. All experiments shall be designed to avoid distress and unnecessary pain and suffering to the experimental animals

Revision of the European Directive 86/609

- ✓ *Protection of Animals*
- ✓ *Ethical Review*
- ✓ *Housing and Care Standards*
- ✓ *Transparency*
- ✓ *Inspections*
- ✓ *Education and Training*
- ✓ *Avoiding Duplication*

Quality of life in captivity

=

Quality of experimental data

Developmental Neurotoxicity Testing (OECD guidlines)

in vivo assessment ➡ **Three Rs concept**

Replacement: are there alternative methods which account for the complexity of brain functioning?

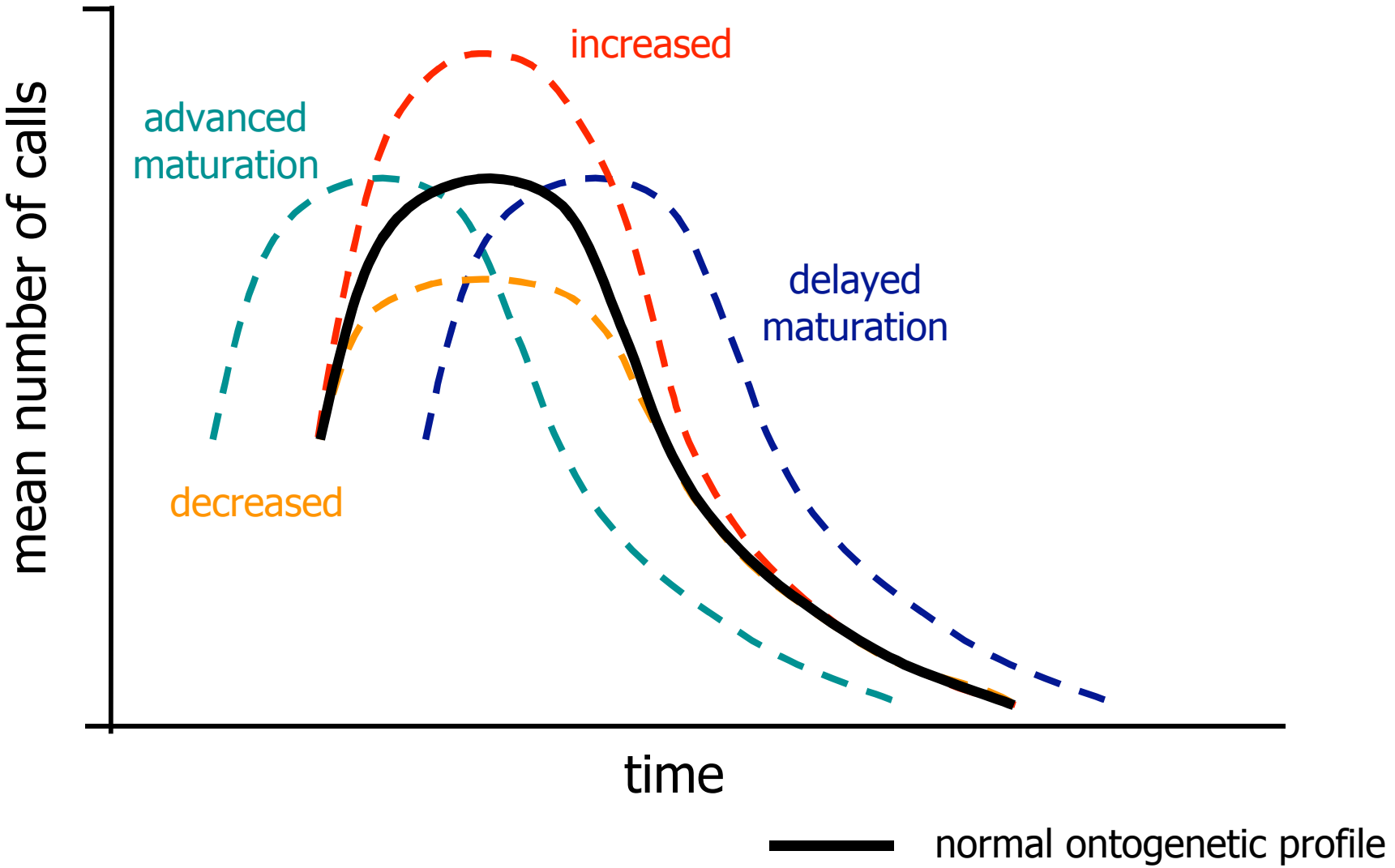
Reduction: any approach in scientific research and product testing that leads to a decrease in the number of animals used (statistical methods, experimental design, use of existing data bases, longitudinal studies)

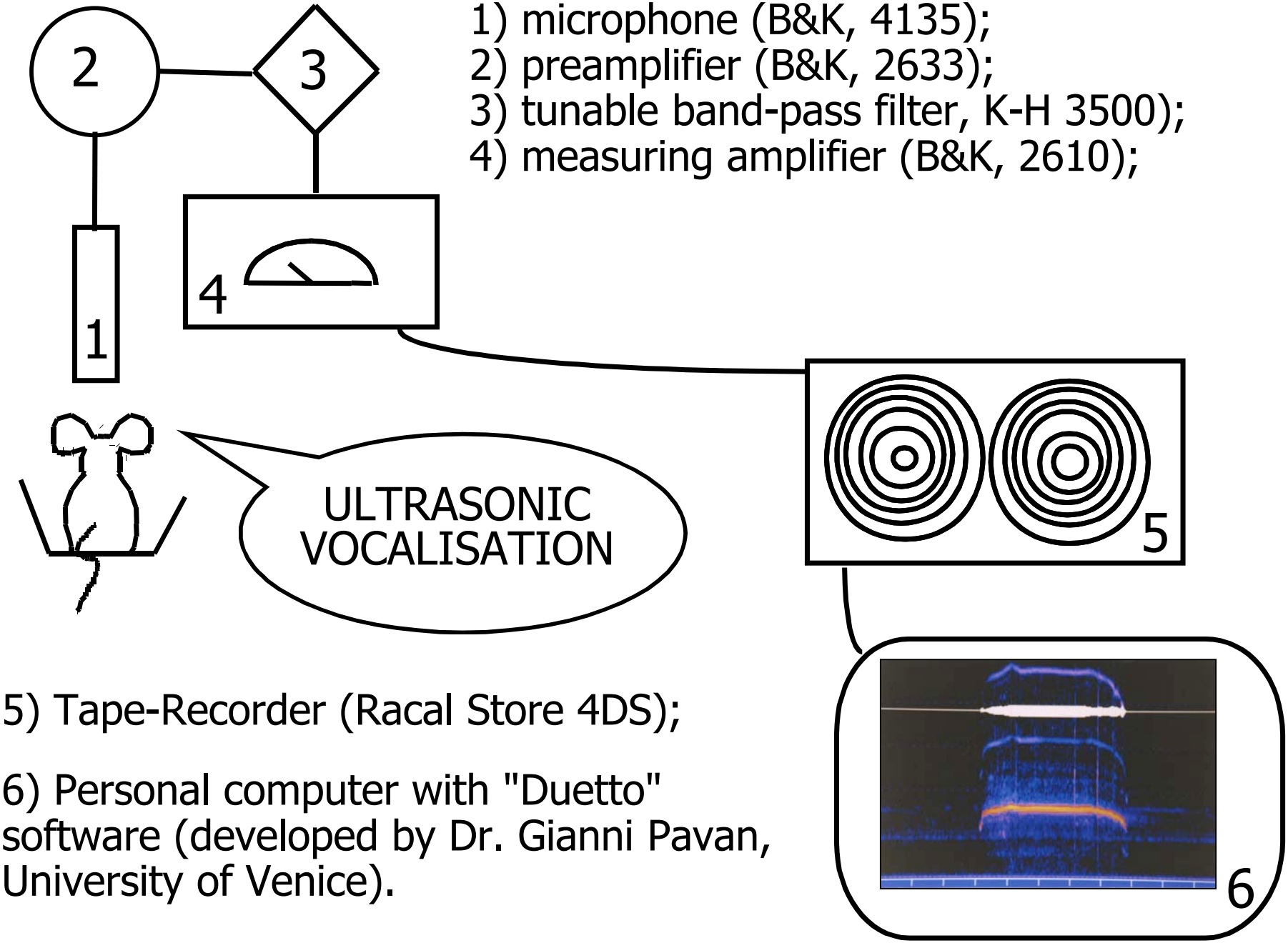
Refinement: any approach which avoids or minimises the actual or potential pain, distress and other adverse effects suffered at any time during the life of the animals involved, and which enhances their wellbeing

Refinement in DNT

- ✓ Housing and husbandry (enrichment)
- ✓ Specificity of the developing organism: ecological niche (i.e.mother-offspring bound)
- ✓ Methods to measure behaviour: ecological approach to minimise stress and ameliorate data quality

ULTRASONIC VOCALIZATIONS: ALTERATIONS OF ONTOGENETIC PROFILE





1) microphone (B&K, 4135);
2) preamplifier (B&K, 2633);
3) tunable band-pass filter, K-H 3500);
4) measuring amplifier (B&K, 2610);

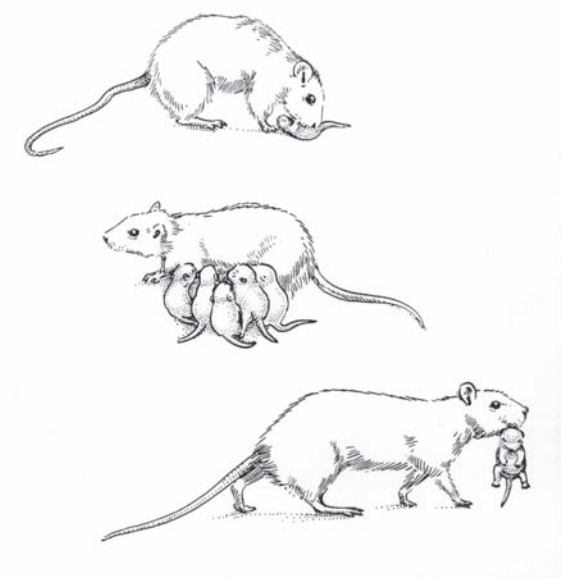
5) Tape-Recorder (Racal Store 4DS);

6) Personal computer with "Duetto" software (developed by Dr. Gianni Pavan, University of Venice).

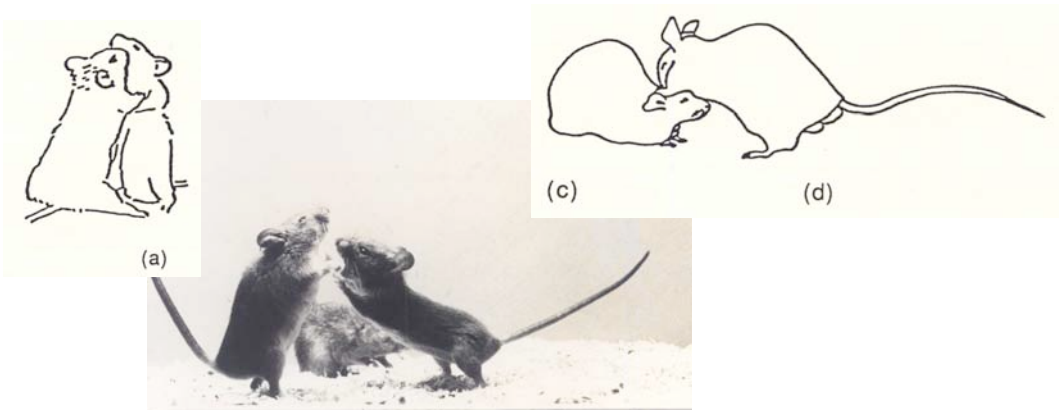
SOCIAL BEHAVIOUR

- the investigation of social behavior in animals presents several concerns that are not usually present when studying individual subjects
- the assessment of social behavior profile at successive developmental phases is important since it is markedly age-dependent
- sexually dimorphic
- two kinds of social interactions during development:

a) mother-offspring

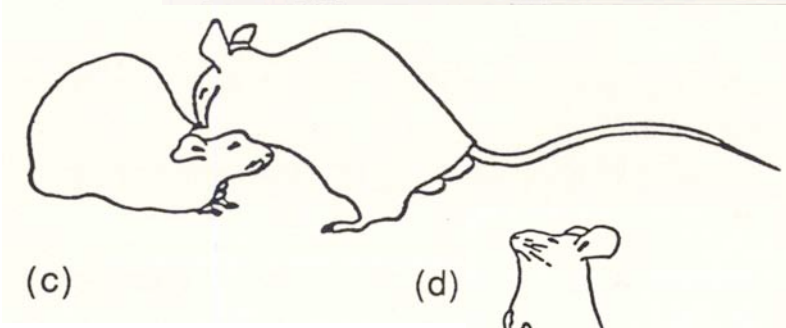


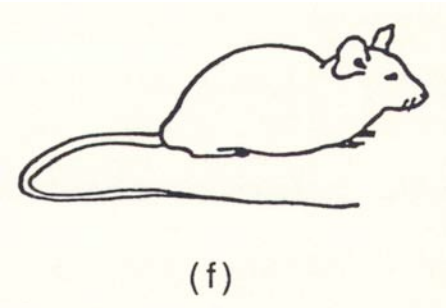
b) between individuals of same age

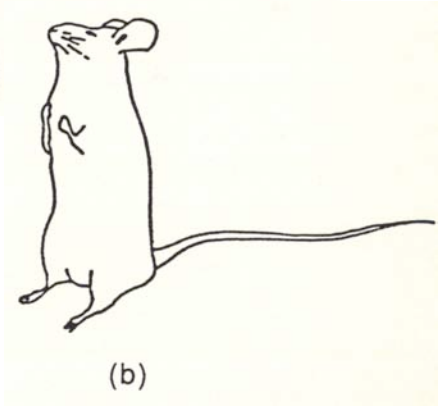


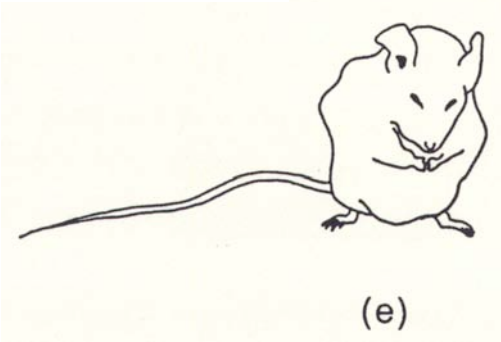
Automated data collection is impractical at best and usually necessitate the use of observational (i.e., ethological) methodologies.

AGGRESSIVE BEHAVIOR IN THE MOUSE SPECIES









(a) Defensive Upright Posture; (b) Submissive Upright Posture; (c) Submissive Crouched Posture; (d) Aggressive Grooming; (e) Self-Grooming; (f) Freezing