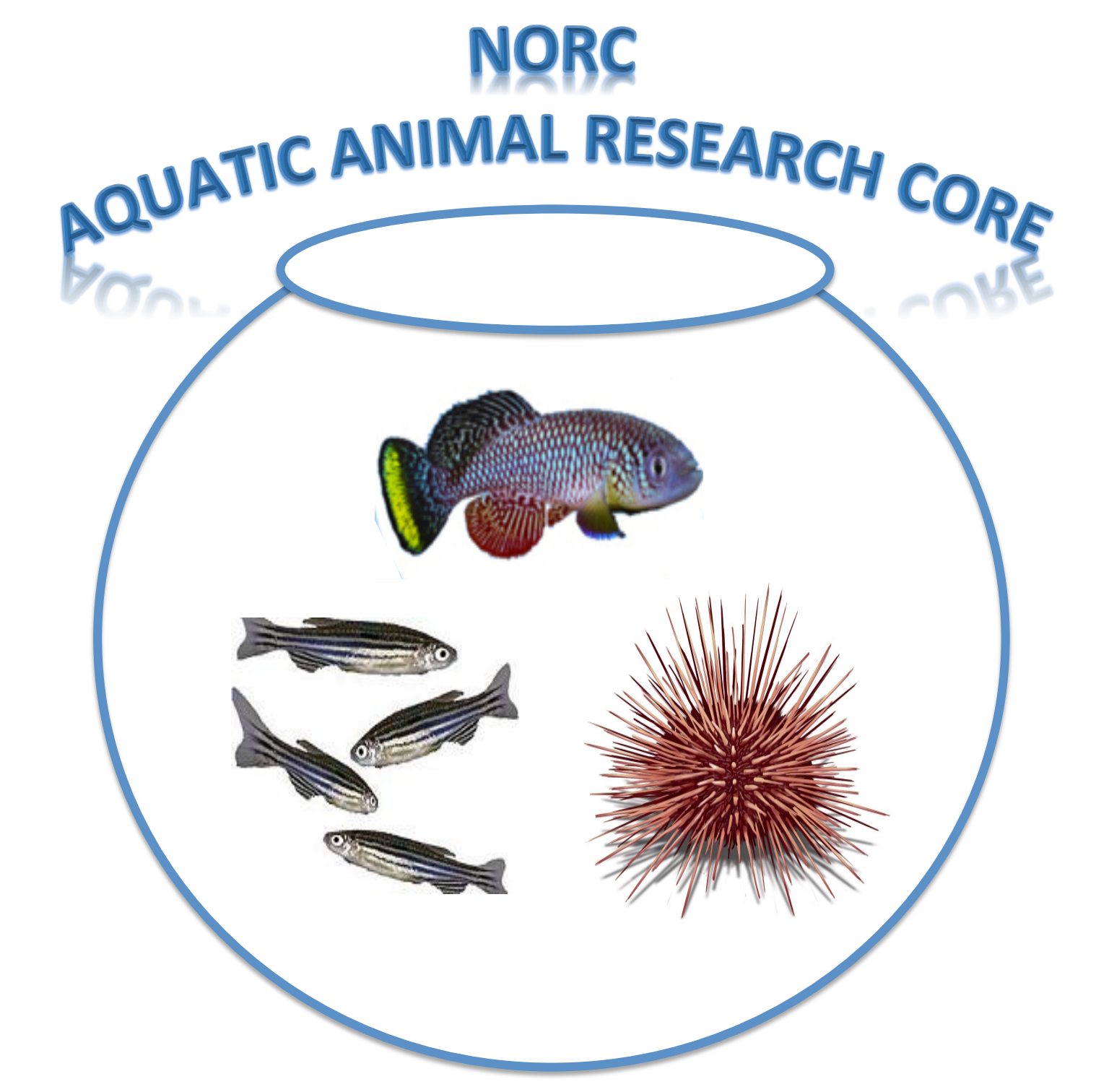




NORC: Animal Models Core Aquatic Animal Research Core

“For a large number of problems, there will be some animal of choice on which it can be most conveniently studied.”
August Krogh



HISTORY: The Aquatic Animal Research Core (AARC) was developed in 2009 to support the use of aquatic animal models in research in the NORC. The AARC is composed of ca. 400 tanks dedicated to the support of nutrition and obesity research using appropriate aquatic models. The AARC can formulate and provide aquatic diets for inclusion of specific nutrients, toxicants, or drugs and provide feed management as determined by experimental protocols.

RESOURCES: The core maintains wild-type lines of the fresh water fish *Danio rerio* (zebrafish) and *Nothobranchius furzeri* and one marine species the sea urchin, *Lytechinus variegatus* (an excellent model for early embryological development).

Danio rerio (Zebrafish)



Advantages of the zebrafish as a model for vertebrate development

- Embryos develop externally and can be viewed and manipulated at all stages
- Transparent embryos
- Rapid development
- Short generation time 3-4 months
- High fecundity (200+ eggs/week)
- Easy to induce mutations
- Fully sequenced genome with extensive similarities to the human genome

Applications of Fish Models

- Cancer
- Organ development
- Developmental neurotoxicity
- Bone formation
- Leukemia
- Immune response
- Aging
- Toxicity models



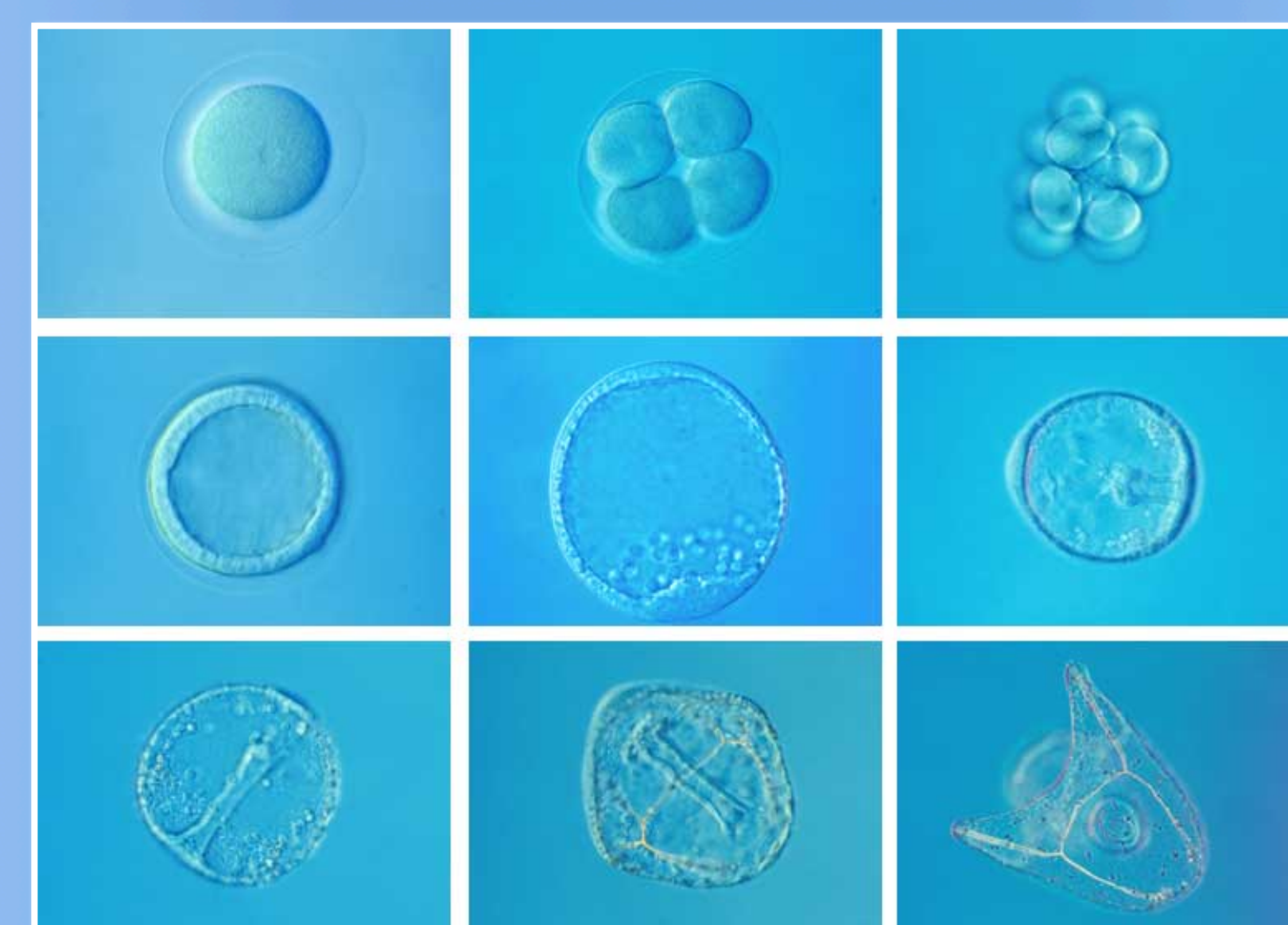
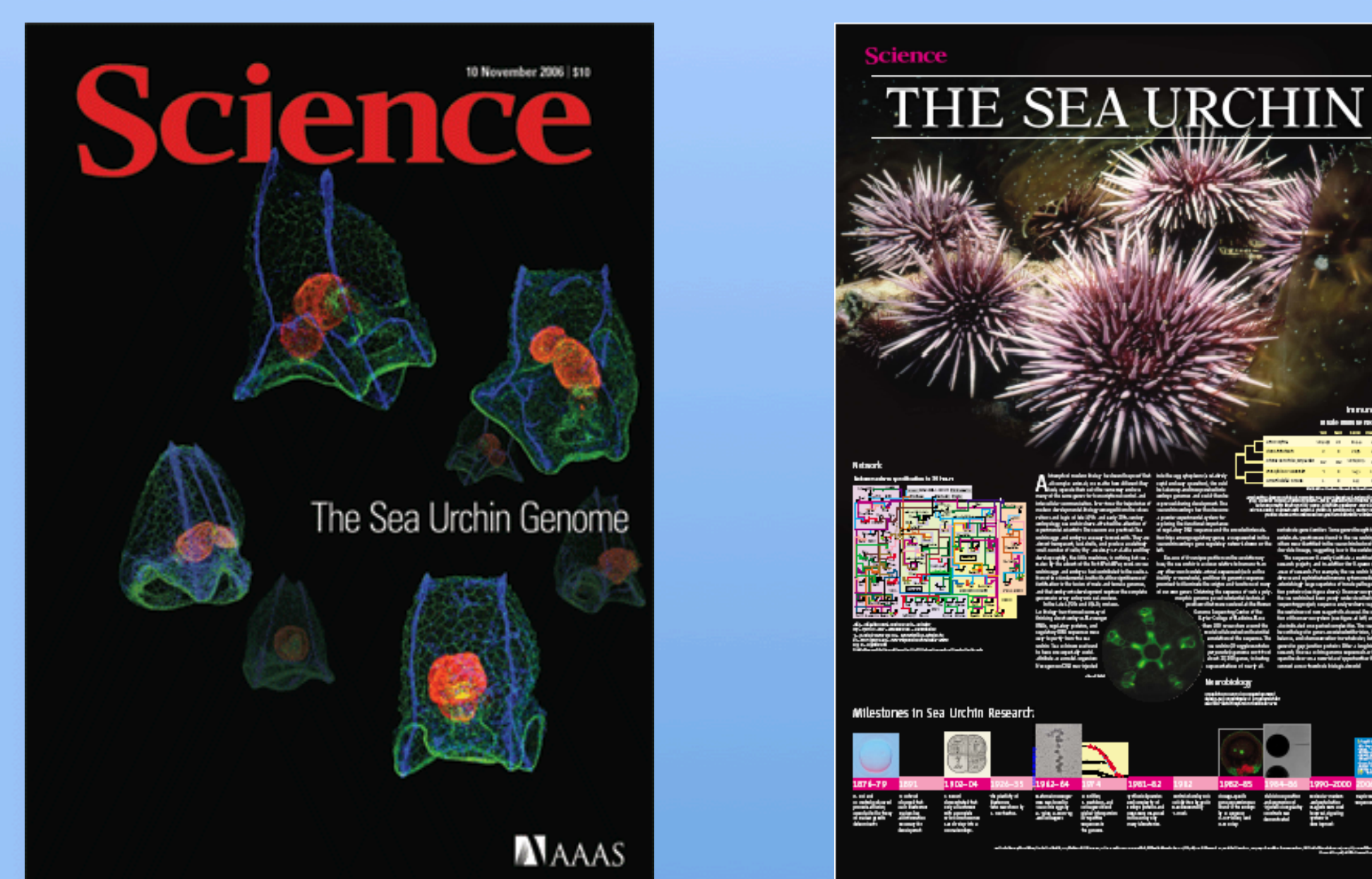
MISSION: To work with researchers to apply aquatic model organisms to address questions where nutrition may be a critical contributing factor on the final outcomes.

The Aquatic Animal Research Core infrastructure includes:

- Two five-shelf systems capable of holding up to 60, 2.8 liter tanks for zebrafish
- Two six-shelf systems capable of holding up to 72, 2.8 liter tanks for zebrafish
- A 1100 liter self-contained freshwater Marineland aquaria system
- One six-shelf system capable of holding up to 72, 2.8 liter tanks for *N. furzeri*
- A 3,700 liter recirculating artificial saltwater system for saltwater species.
- All systems are equipped with mechanical, biological, and UV sterilization equipment. All core water is provided by an R/O unit attached to cation/anion resin and water quality in all systems is monitored by core personnel.

Service	Fees
Base Tank Charge	\$0.20/day (15 zebrafish fish/tank) \$0.20/day (2 <i>N. furzeri</i> /tank)
Feed	\$115/250 grams (additional consideration for specialty ingredients or drugs)
Chemical Carcass Analysis (Fat Analysis)	\$18/sample

Lytechinus variegatus (sea urchin)



Advantages of the Sea Urchin model

- Transparent rapidly developing embryos
- High fecundity (up to 1,000,000 eggs/female)
- Highly synchronized development
- Fully sequenced genome
- External development allows easy manipulation

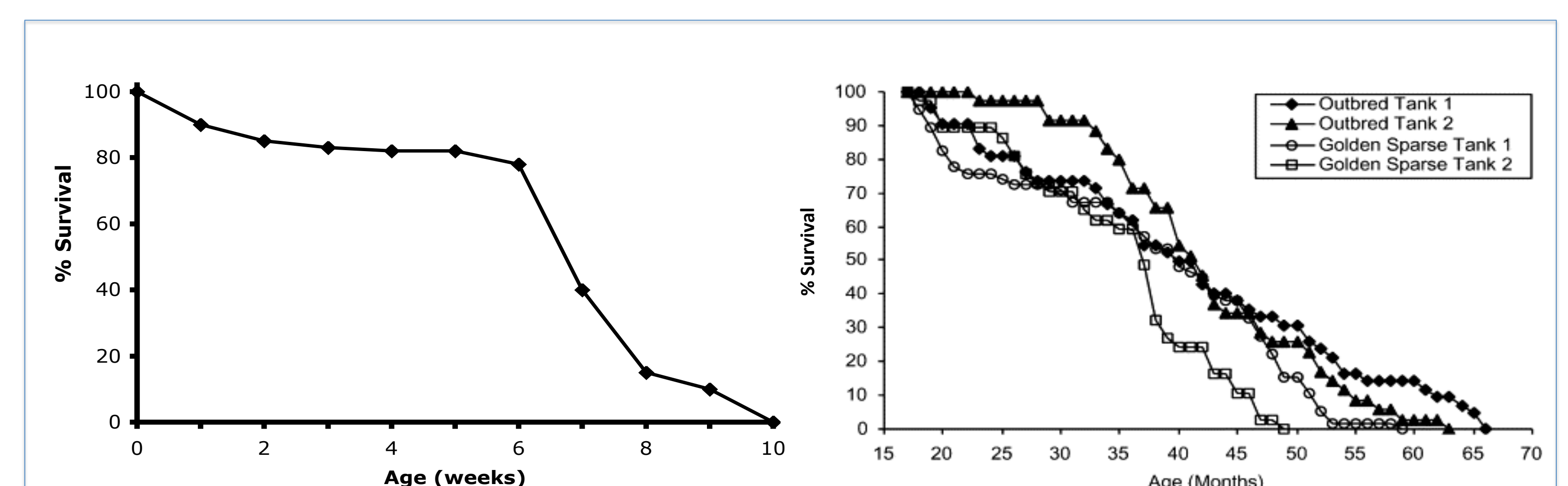
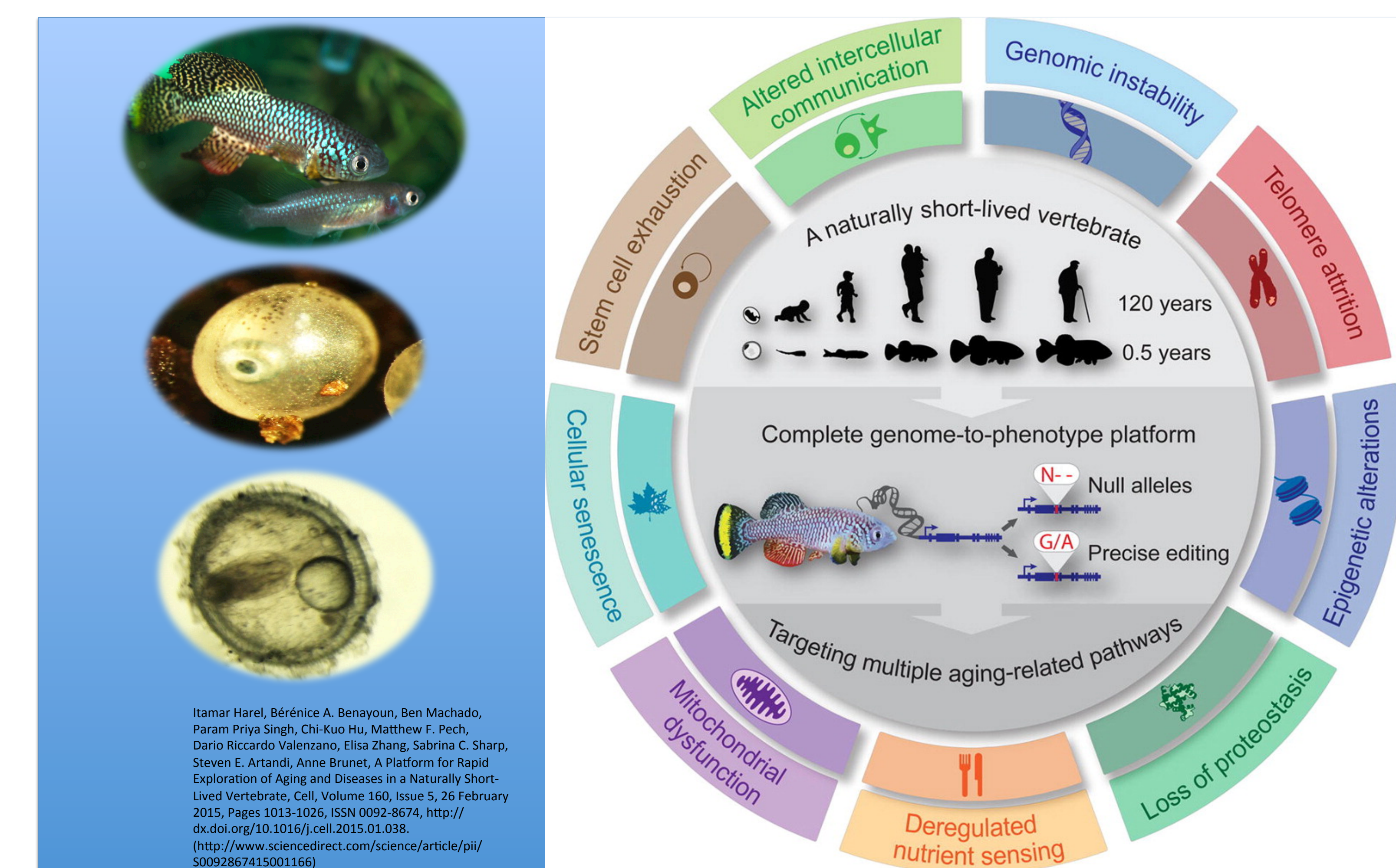
Current Biomedical Applications of the Sea Urchin Model

- Skeletal (Bone and teeth) formation
- Neurological-cognitive development
- Fetal alcohol syndrome
- Cell signaling
- Source of novel antibiotics
- Gamete function and fertilization
- Evaluation of drugs
- Evaluation of disease related genes
- Identify novel gene targets in disease pathogenesis
- Innate immunity

Nothobranchius furzeri A new model for aging research

	Mouse	Zebrafish	<i>Nothobranchius furzeri</i>
Life span	3-5 years	3-5 years	3-6 months
Fecundity	8-12 pups	100-200 eggs/spawn	25-30 eggs/spawn
Genome	Sequenced	Sequenced	Partially sequenced
Transgenics	Yes	Yes	Yes

	Mouse	Zebrafish	<i>Nothobranchius furzeri</i>
Muscle Degeneration		X	X
Spinal Curvature		X	X
Cognitive Degeneration		X	X
Tumors		X	X
Lipofuscin Accumulation		X	X
Increased lifespan with dietary restriction	X	X	X
Increased lifespan with resveratrol	X	X	X



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