SWAN:
Semantic Web Applications in Neuromedicine

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What is SWAN?

Semantic Web Applications in Neuromedicine

SWAN is a project to create

- A common digital framework for shared knowledge annotation and organization of scientific discourse
- A robust community process for sharing knowledge via the framework
- A scalable environment for use of Semantic Web in real biomedical applications by bench scientists

What is SWAN Not?

SWAN isn't a project to create

- A model of biology
- A model of the internal structure of discourse
- A "correct view" of scientific theory

Ontology of Discourse

SWAN is about the coarse-grained semantics of scientific discourse, specifically:

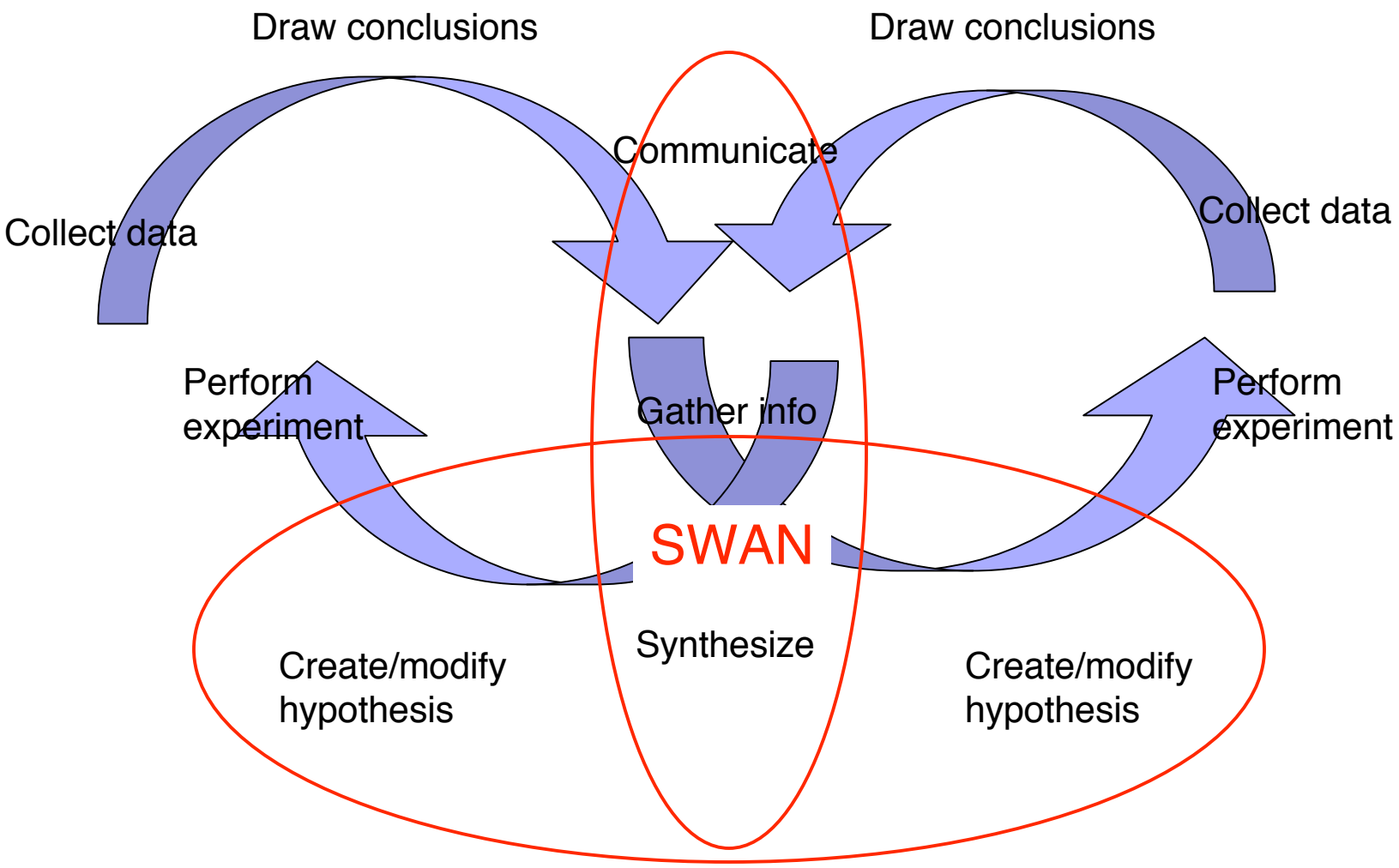
what assertions are made in publications;

what is the evidence for these assertions;

how assertions from one publication relate to another;

how the assertions connect to concepts in other ontologies.

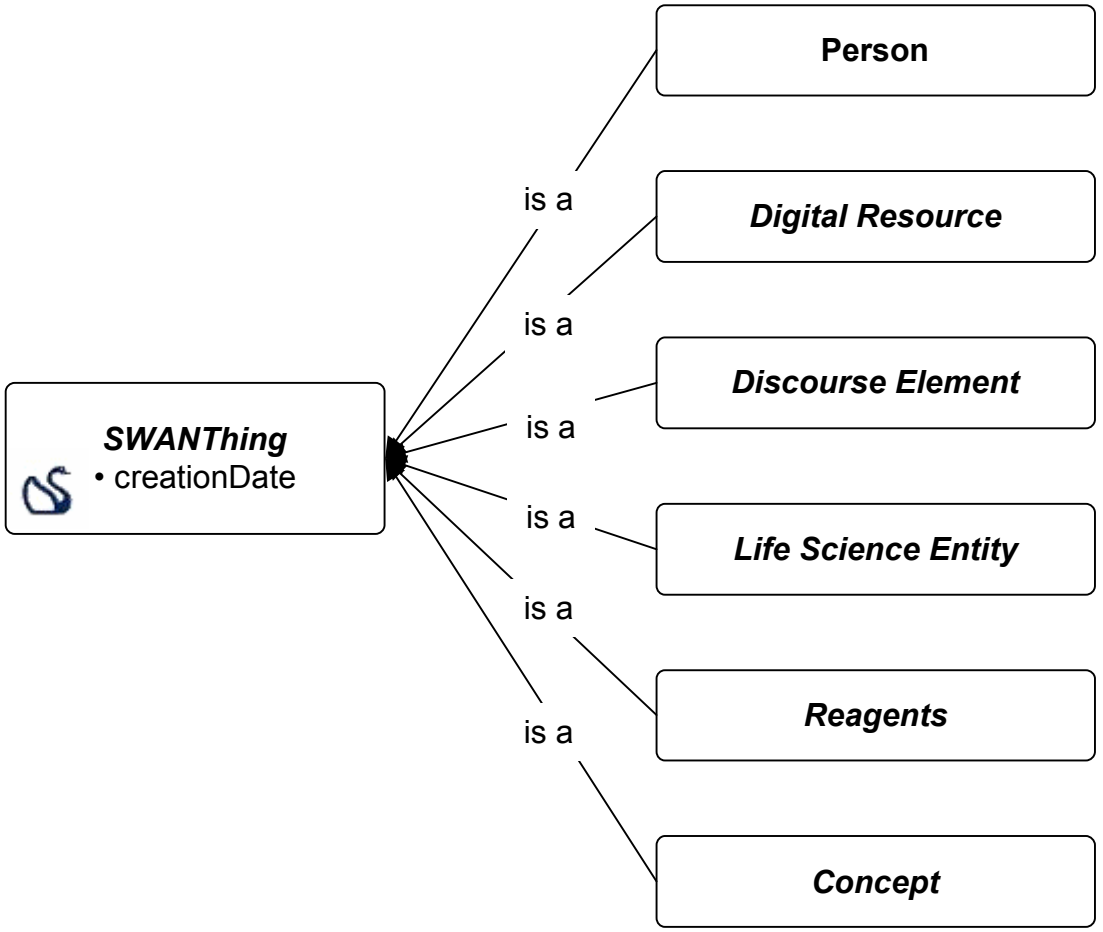
The Knowledge Ecosystem: Interlocking Cycles of Research



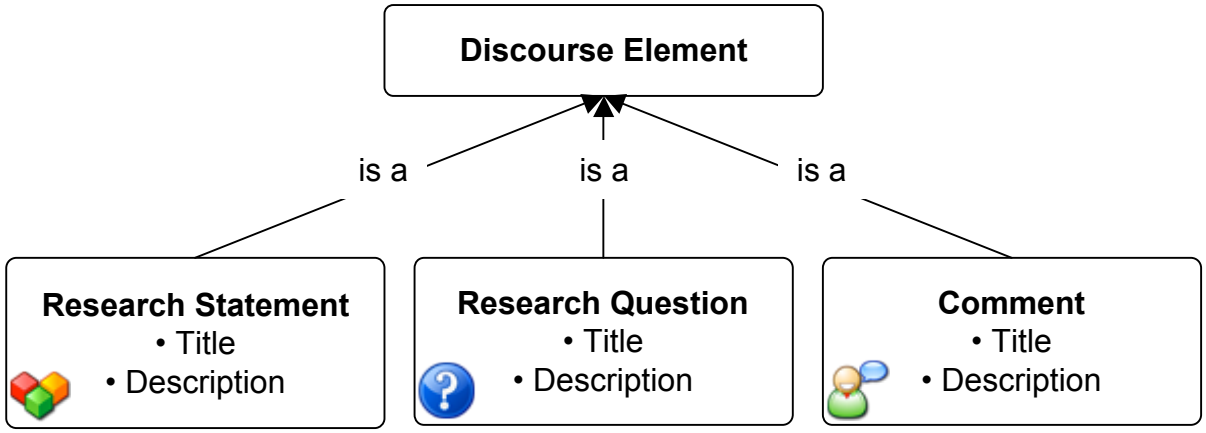
SWAN Deployment

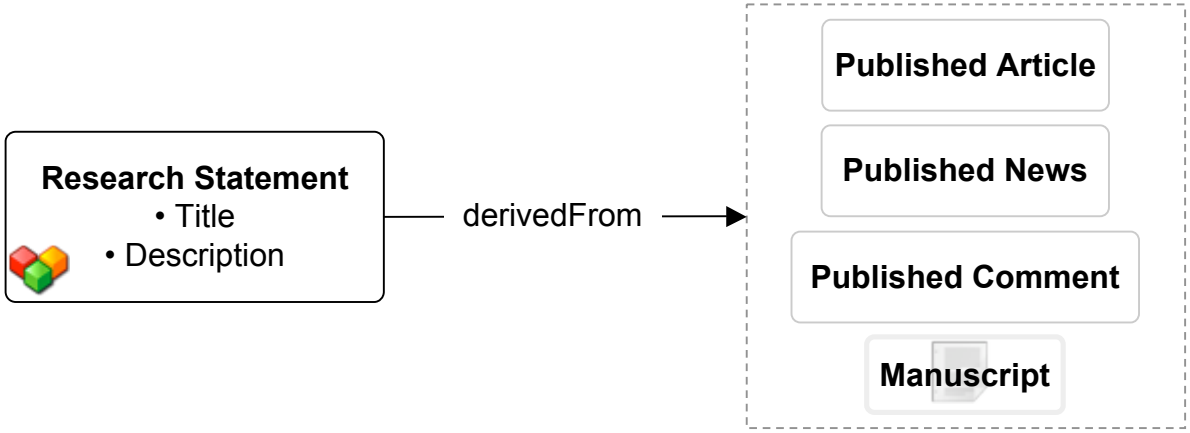
- SWAN will be deployed on the Alzheimer Research Forum (Alzforum) website in 2007.
- Alzforum is a moderated, scientific web community, for the Alzheimer Disease (AD) research community, with over 4,000 registered members.
- A substantial proportion of the world's AD researchers are members of Alzforum.

SWAN Main Hierarchy

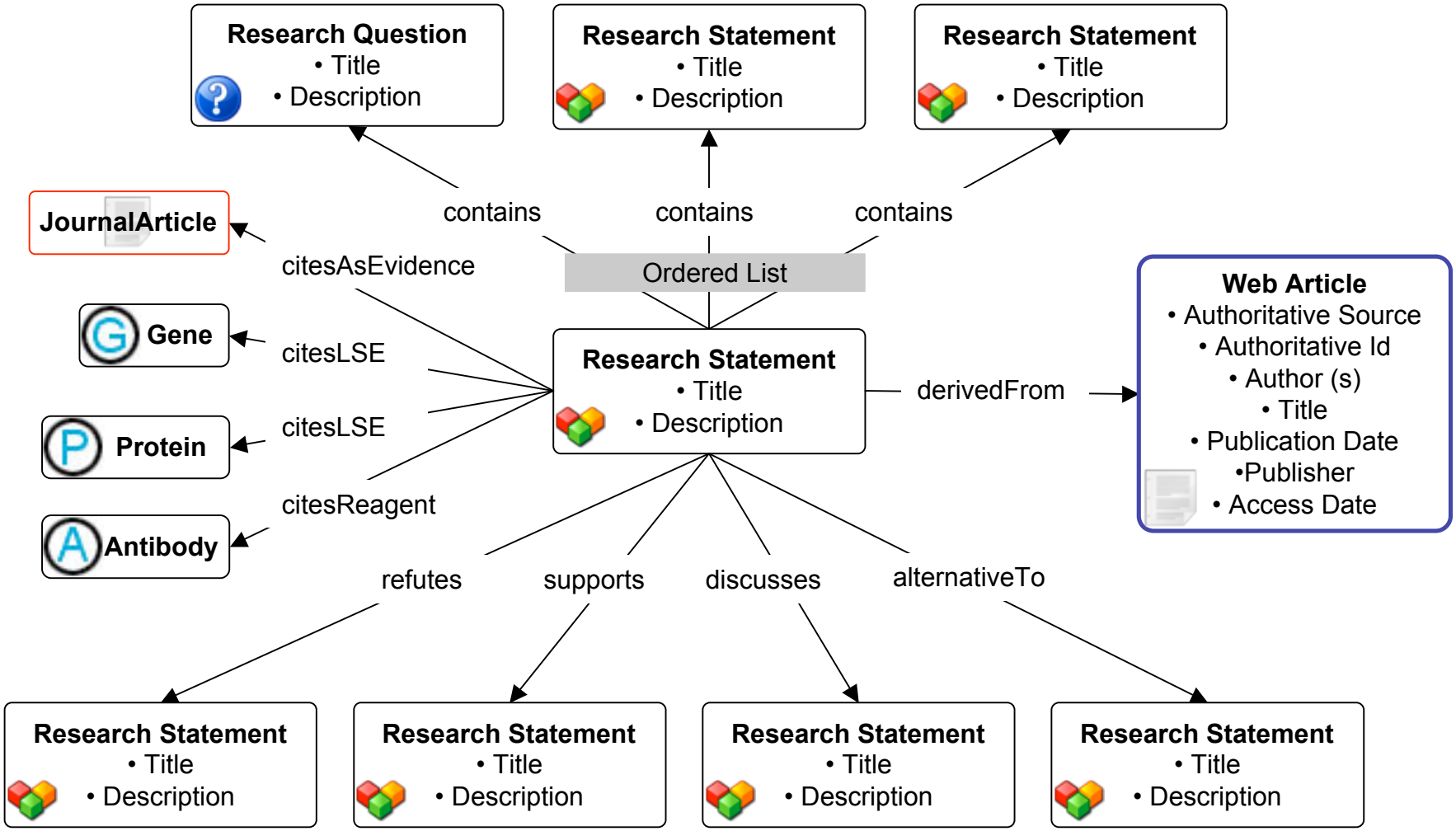


Discourse Elements

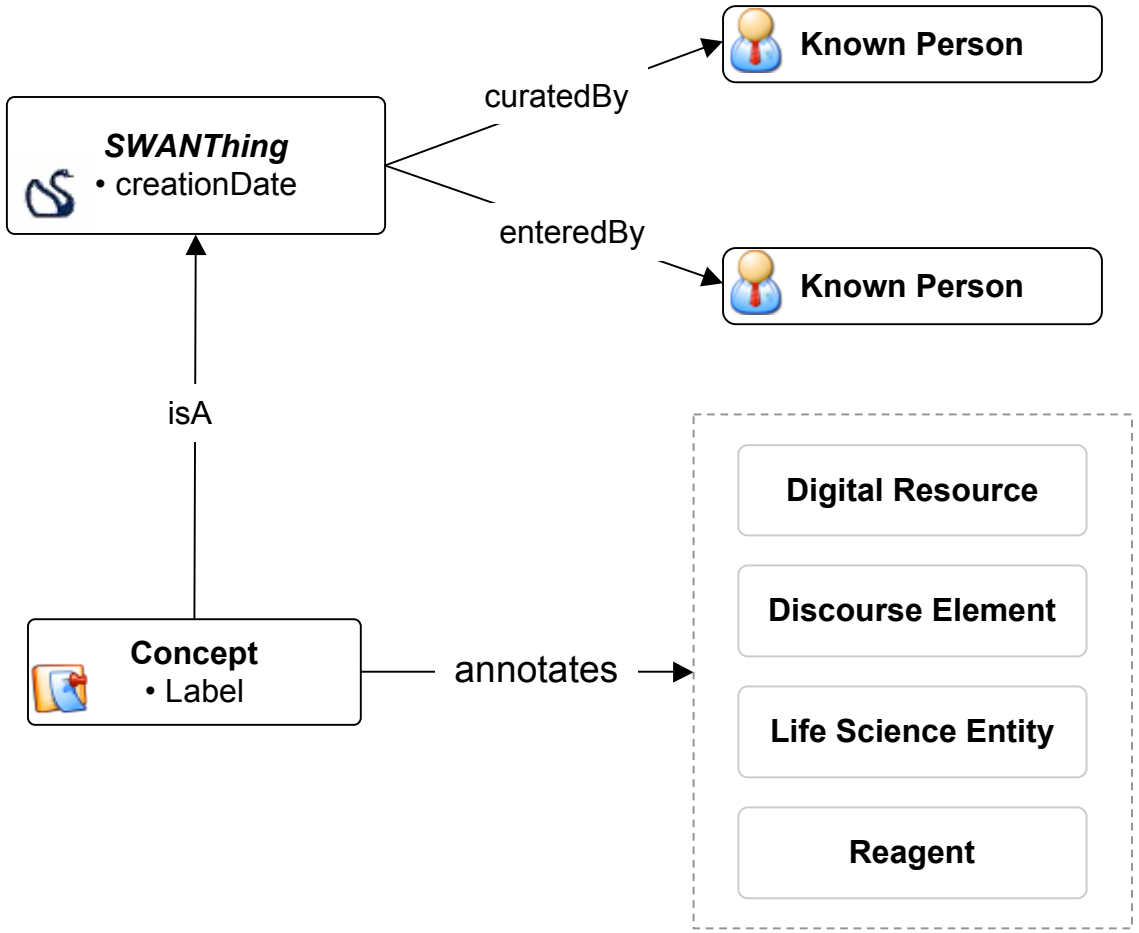




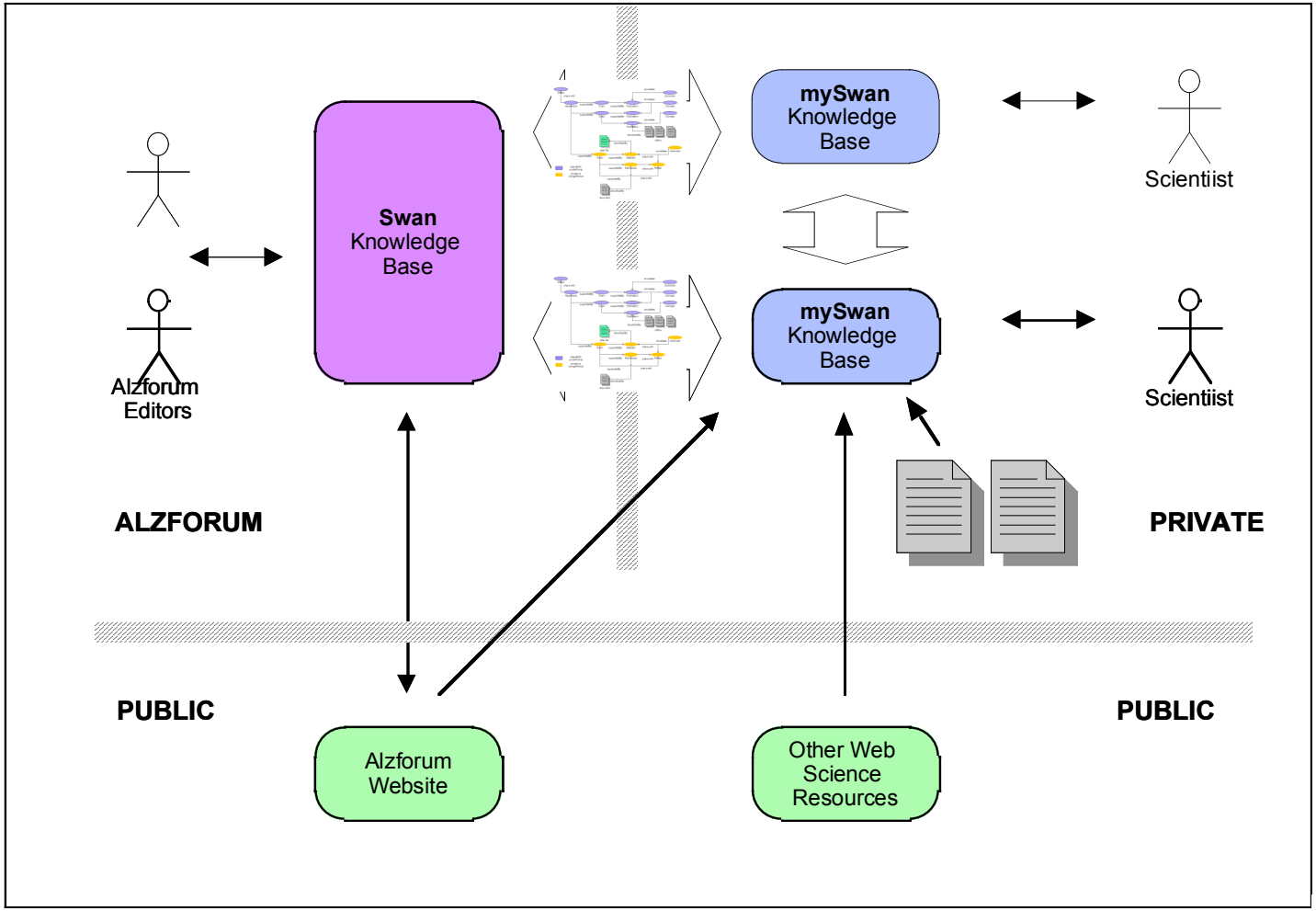
Research Statement



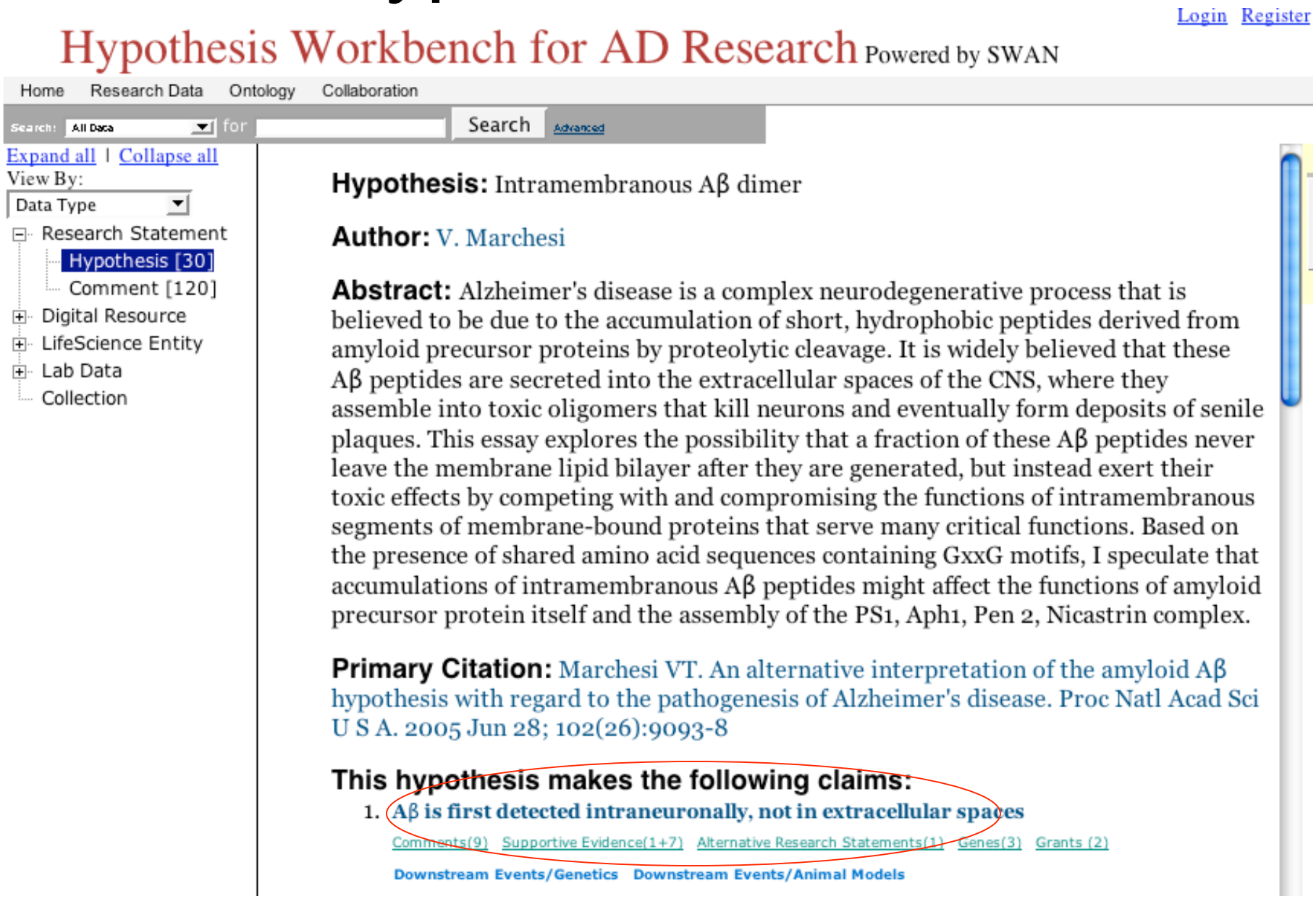
Concepts (Tags)



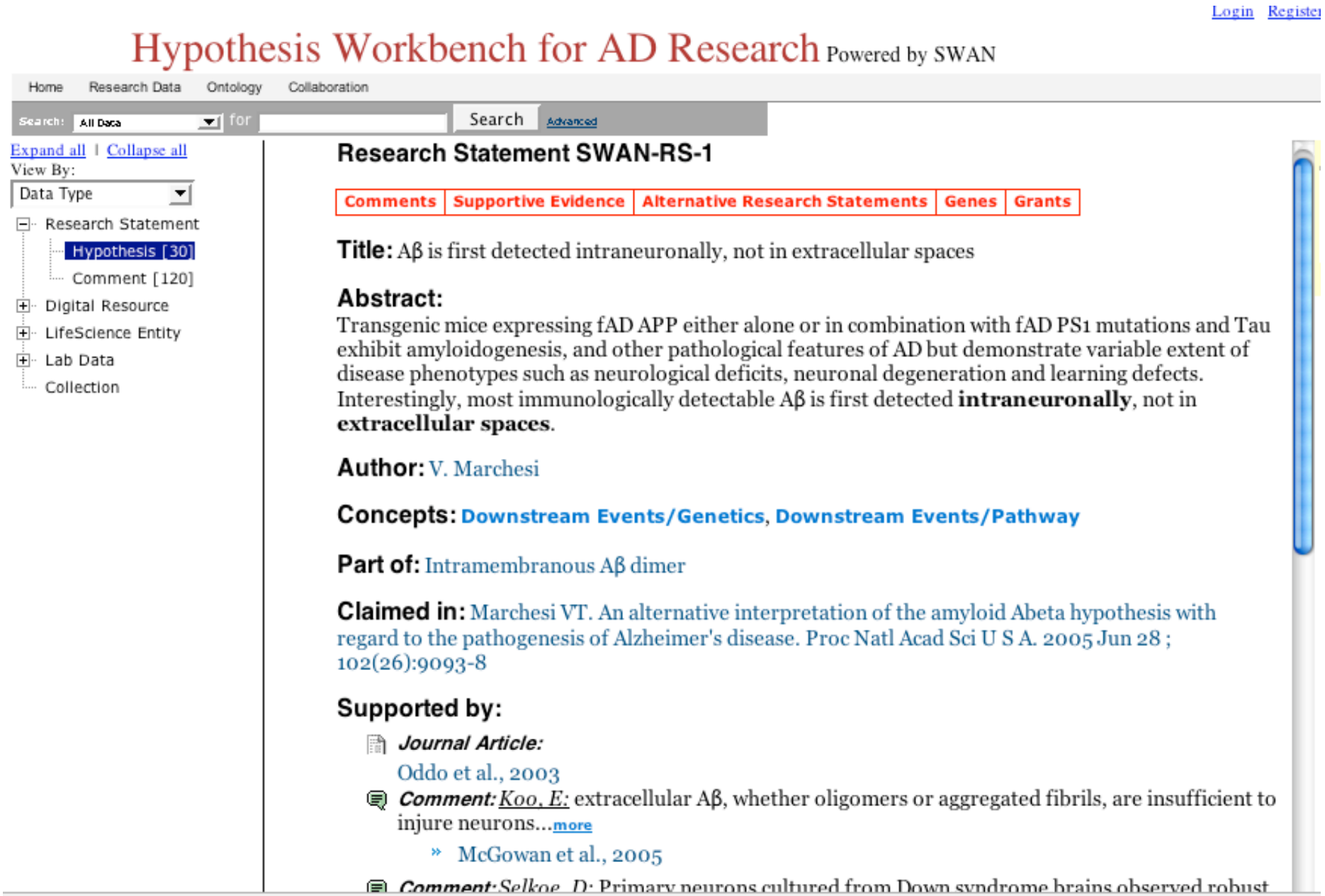
Community-Individual Interaction



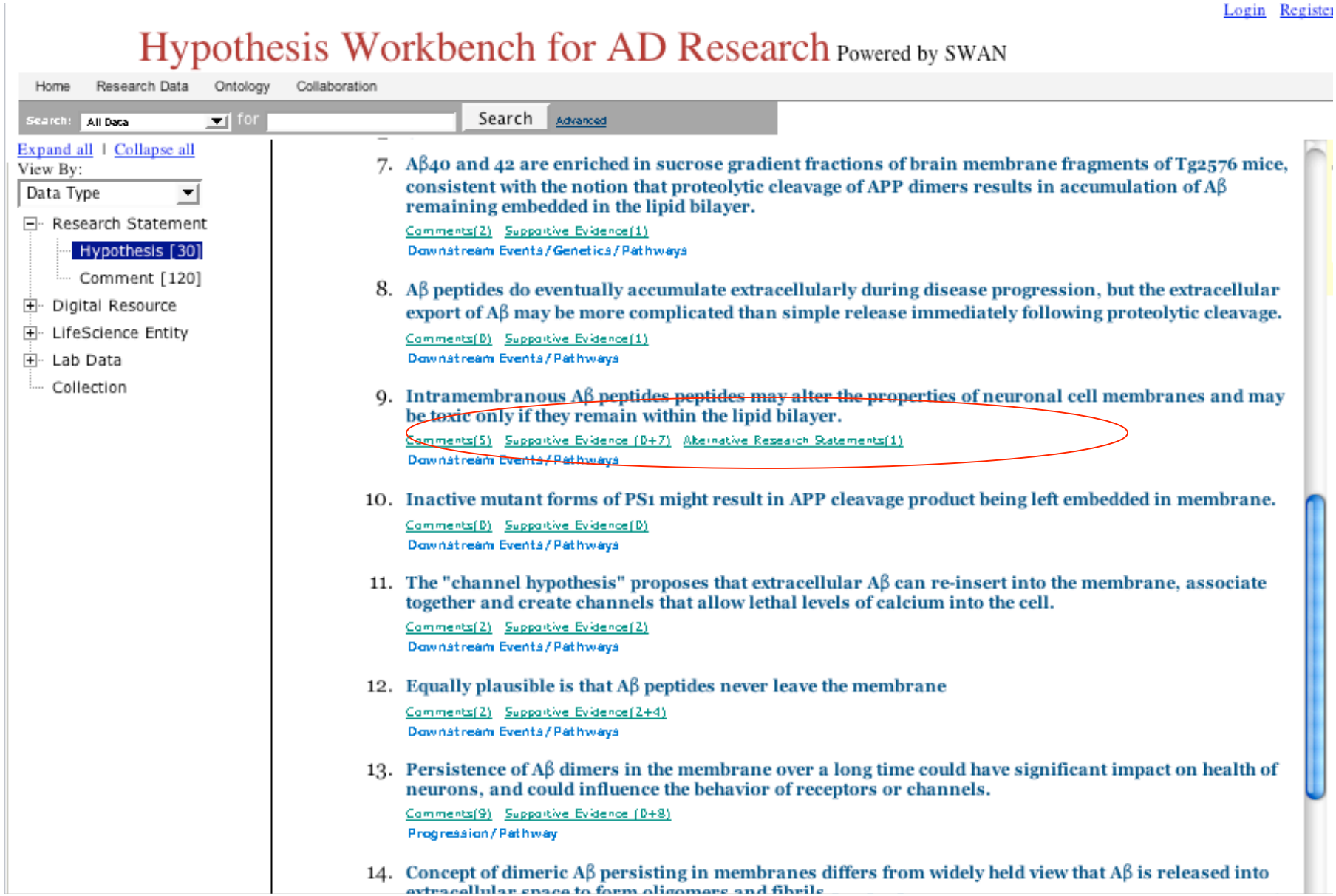
Hypothesis Detail



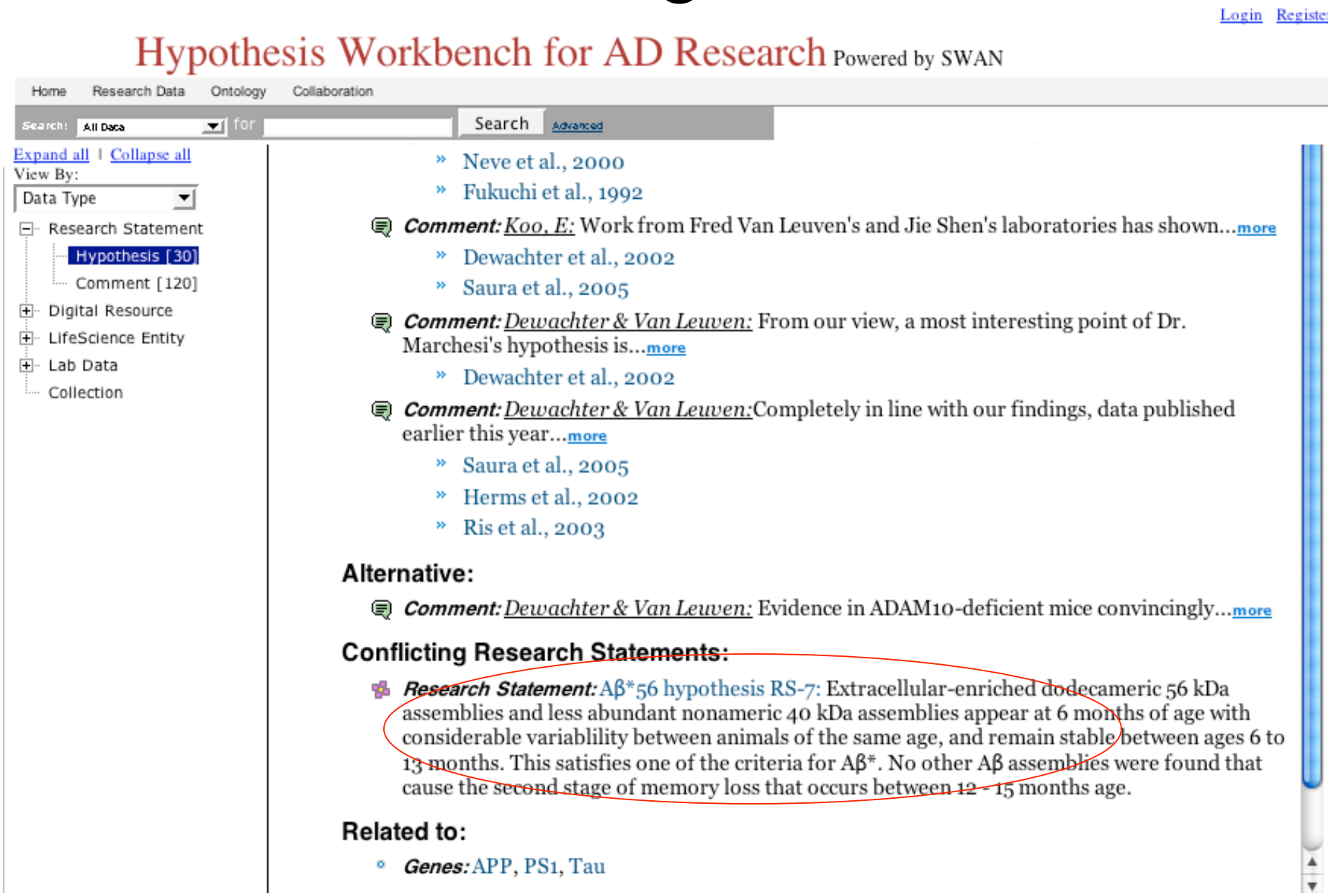
Research Statement - Example 1



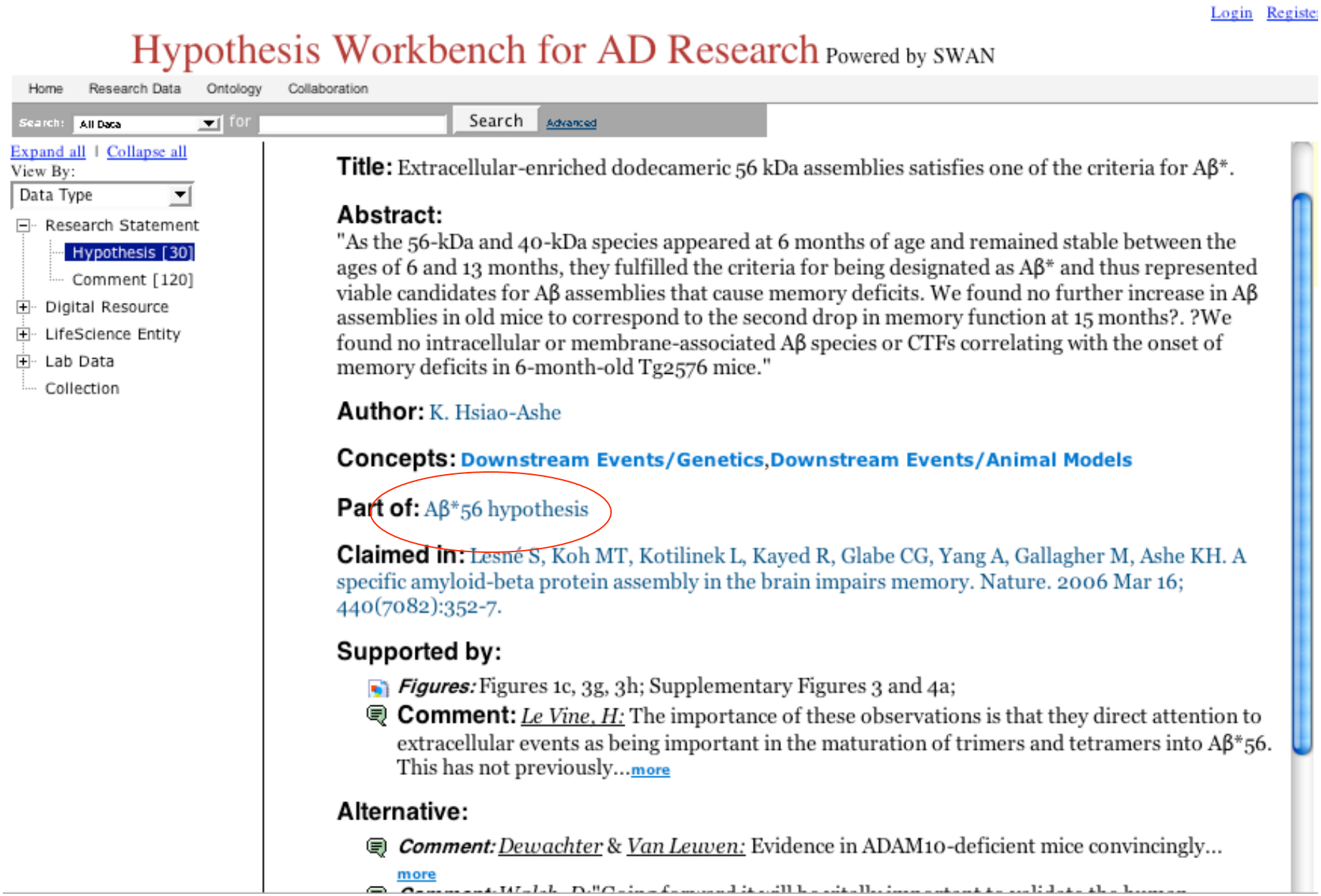
Linking Across Hypotheses



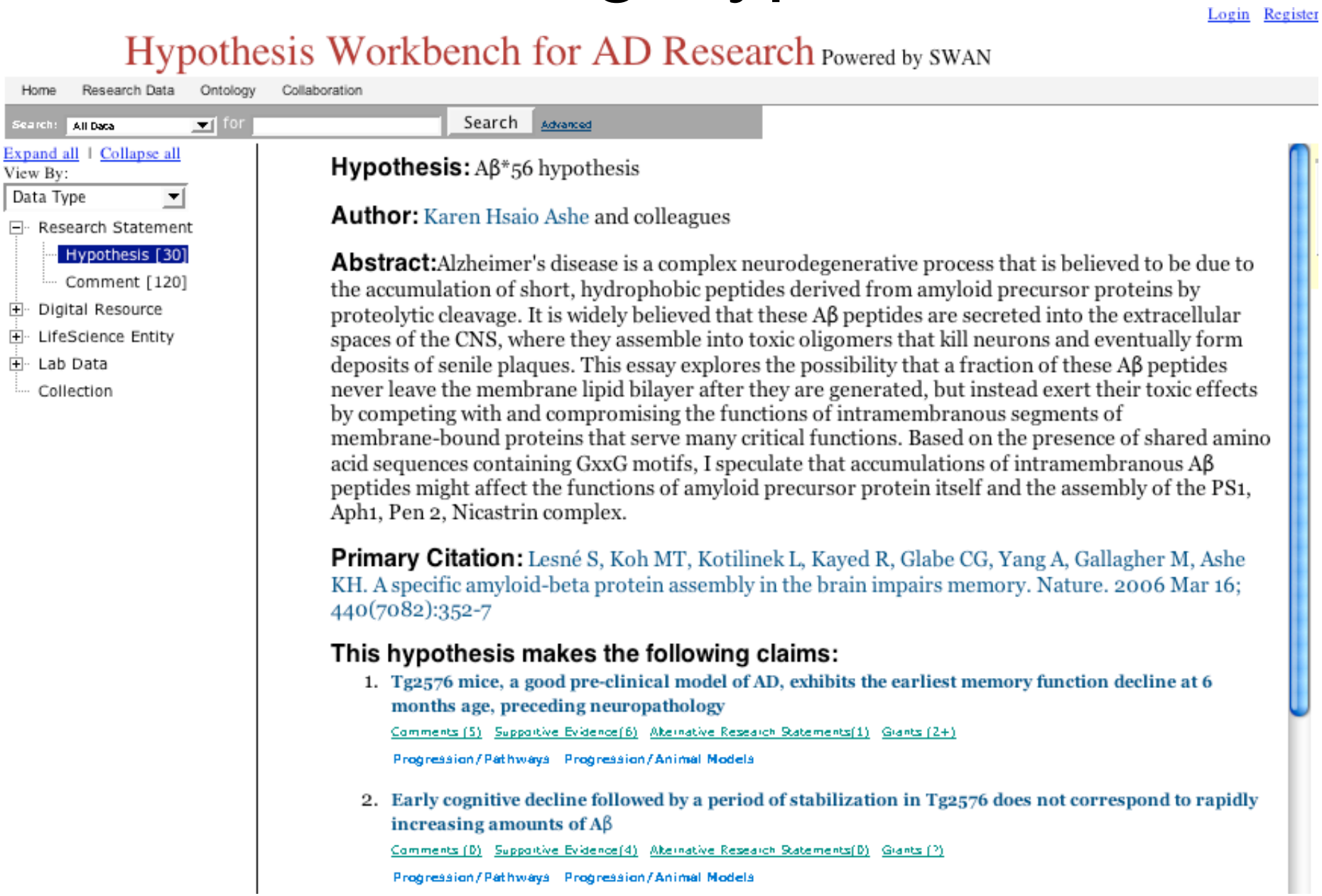
A Conflicting Statement



Navigating to Conflicting Hypothesis



Conflicting Hypothesis



Comparing Hypotheses with Pathogenic Narratives

Title	Initial Conditions	Perturbations	Downstream Events	Progression	Convergence	Therapy
Intraneuronal Aβ dimers (Marchesi 2005)	APP, PS1, GPA, ErbB,		Intramembranous Aβ40 and Aβ42, APP dimers,	Channels of Aβ40 allow lethal Ca2+ into cells,	Intramembranous Aβ dimers reduces receptor function,	Therapies directed to extracellular Aβ may miss toxic species,
Aβ*56 (Lesne et al, 2006)	APP, PS1 bram,		Soluble Aβ assemblies disrupt memory.		Tg2576 exhibit early memory decline preceding neuropathology,, Aβ*56 can cause memory deficit in healthy rats	Therapies to Aβ*56 may provide reversibility in disease prior to permanent damage,
Ceramide and aging (Costantini et al, 2005)		Late onset AD associated with aging, hypercholesterolemia, atherosclerosis, head trauma, stroke. Ceramide involved in neurodegeneration.	Smase generates ceramide,, nSMadse2 regulated by p75 neurotrophin receptor	Chronic increase in intracellular ceramide inhibits axonal elongation and activates cell death.		
Cholesterol and aging (Costantini et al, 2005)		High concentration of cholesterol in brain or cells can increase Aβ	Aβ oxidizes membrane cholesterol, liberates H2O2 and increases oxidative stress	Aging is associated with progressive oxidation of circulating lipoprotein, leads intracellular accumulation in lysosomes		Statins
Pathways of Aβ oligomerization (Bitan et al., 2003)			Photocrosslinking reveals Aβ42 Pentamers and hexamers as basic units for further assembly		Oligomers of Ab42 assemble into paranuclei which leads to fibrillar structures. Ab40 lacks ability to form paranuclei	

SWAN relationships & interactions with other projects

- Alzheimer Research Forum
- Massachusetts ADRC
- W3C HCLS WWW2007 Demo
- IBM SLRP (Boca)
- SenseLab (Yale) - under discussion
- HyBrow (Stanford) - under discussion
- IIC - Stem Cell Digital Collaboration Framework (Harvard) - under discussion

The SWAN Team

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- Alzforum: Elizabeth Wu, Gwen Wong, June Kinoshita
  www.alzforum.org
- IBM: Ben Szekley
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website: http://swan.mindinformatics.org

The Beautiful Swan – by William Nicholson, British (1872–1948), color lithograph after a woodcut, 1900. Campbell 73b.