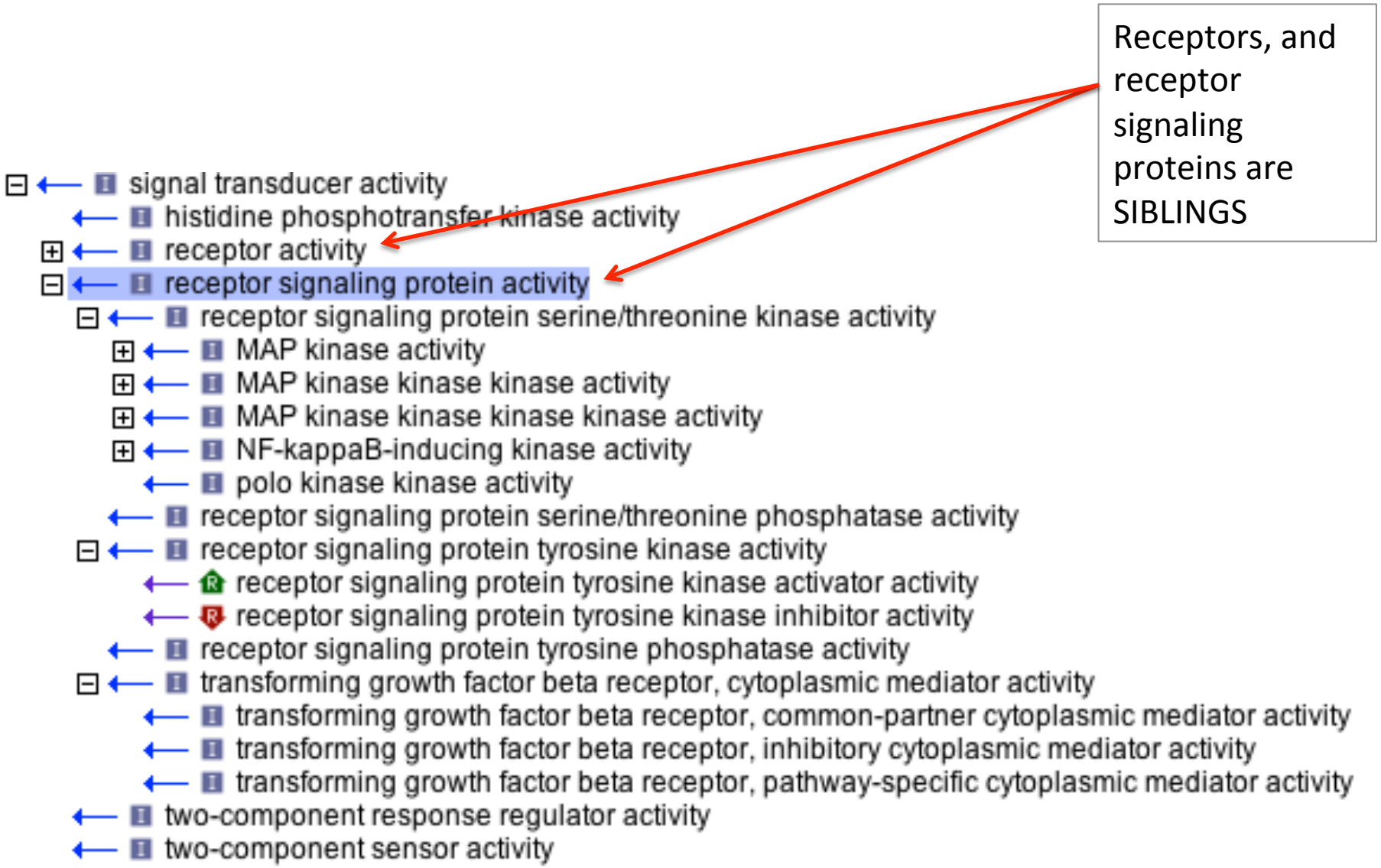
PROPOSAL TO CLEAN UP RECEPTOR SIGNALING PROTEIN ACTIVITY

January 2011

Current view (December 2010)



PROBLEMS

- It's unclear what the function of a 'receptor signaling protein' is.

- receptor signaling protein activity ; GO:0005057 (and its children) has been used to annotate both receptors and downstream molecules. Its (recently added) definition is intended for the latter:

Conveys a signal from an upstream receptor or intracellular signal transducer, converting the signal into a form where it can ultimately trigger a change in the state or activity of a cell.

- Part of the problem is the definition of the children:

E.g. receptor signaling protein serine/threonine kinase activity ; GO:0004702

Catalysis of the reaction: ATP + receptor signaling protein serine = ADP + receptor signaling protein serine phosphate, and ATP + receptor signaling protein threonine = ADP + receptor signaling protein threonine phosphate.

- The definition describes phosphorylation **OF** a receptor signaling protein (Many receptors phosphorylate receptor signaling proteins, so would be included in this definition).
- BUT I think the term is intended for annotation of downstream signaling proteins **THAT POSSESS** ser/thr kinase activity.

PROPOSAL

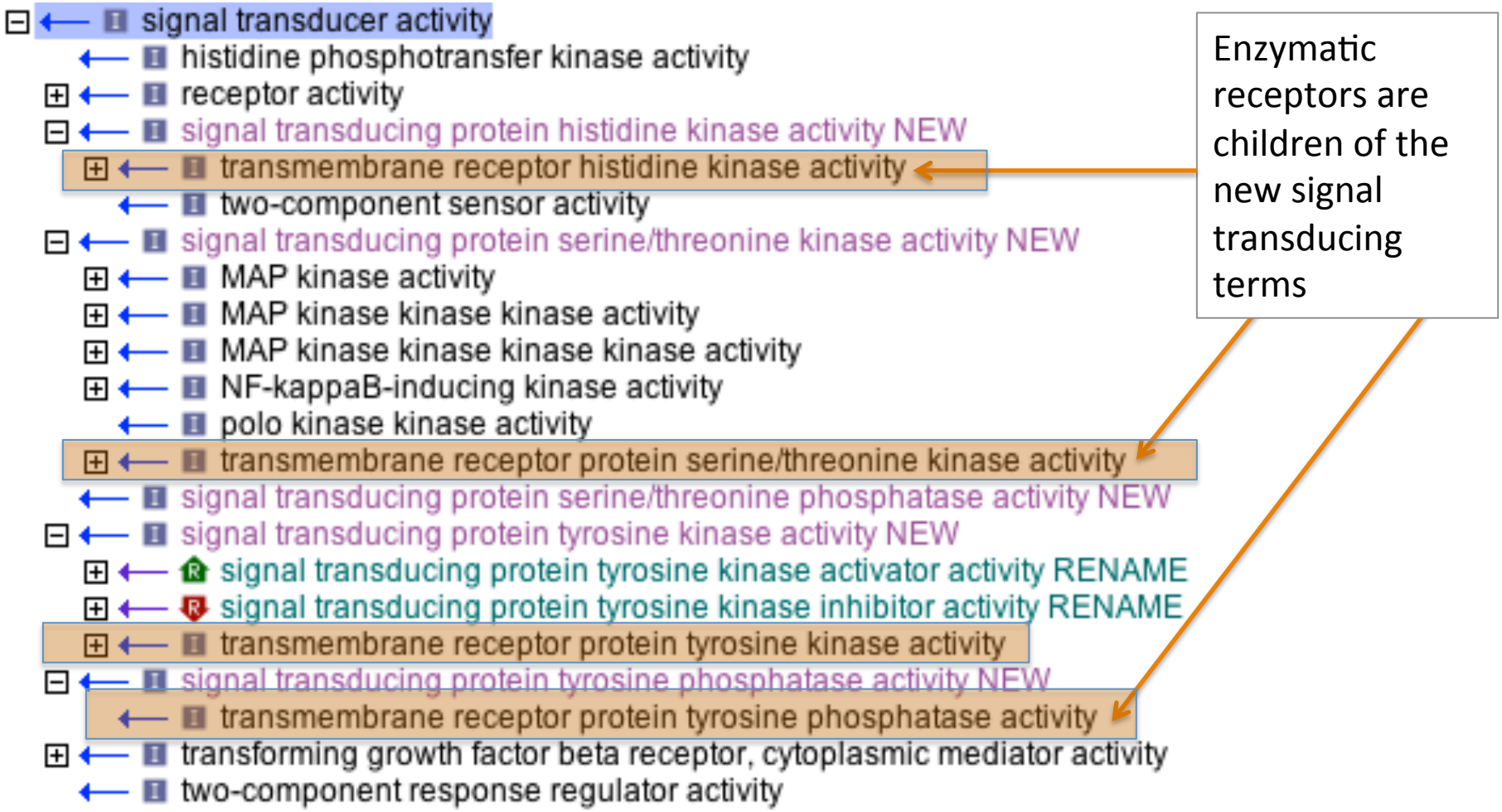
OUTLINE OF PROPOSAL

- Replace existing ‘receptor signaling protein x kinase activity’ terms with broader ‘signal transducing x kinase activity’ terms.

- Place the enzymatic receptor terms under the new ‘signal transducing x kinase activity’ terms.

- Merge the old ‘receptor signaling protein x kinase activity’ terms into the new broader terms.

  NB: merged rather than obsoleted so curators don’t have to spend time re-mapping their annotations.



If we go the HAS_PART route for receptors, we could also use HAS_PARTs for these terms (and rename the new terms to 'protein histidine kinase signal transducer activity ; GO:NEW')

HAS_PART protein histidine kinase activity

is_a signal transducer activity

NB: The proposal would remove the distinction between receptors and the molecules that signal downstream of them.

I'm not sure this distinction (E.g. where the gene product lies in a pathway) belongs in function.

This distinction can be captured by annotating to 'intracellular signal transduction ; GO:0035556' for the downstream molecules.

signal transducing protein serine/threonine kinase activity ; GO:NEW
Functions to pass on a signal by catalysis of the reaction: ATP + protein serine = ADP + protein serine phosphate, and ATP + protein threonine = ADP + protein threonine phosphate. A signal is a physical entity or change in state that is used to transfer information in order to trigger a response. The phosphate group can be transferred to itself or a downstream protein.
Comment: For gene products that signal downstream of a receptor, consider also annotating to 'intracellular signal transduction ; GO:0035556'.

signal transducing protein serine/threonine phosphatase activity ; GO:NEW
Functions to pass on a signal by catalysis of the reaction: protein serine phosphate + H2O = protein serine + phosphate, and protein threonine phosphate + H2O = protein threonine + phosphate. A signal is a physical entity or change in state that is used to transfer information in order to trigger a response. The phosphate group can be removed from itself or a downstream protein.
Comment: For gene products that signal downstream of a receptor, consider also annotating to 'intracellular signal transduction ; GO:0035556'.

signal transducing protein tyrosine kinase activity ; GO:NEW
Functions to pass on a signal by catalysis of the reaction: ATP + a protein tyrosine = ADP + protein tyrosine phosphate. A signal is a physical entity or change in state that is used to transfer information in order to trigger a response. The phosphate group can be transferred to itself or a downstream protein.
Comment: For gene products that signal downstream of a receptor, consider also annotating to 'intracellular signal transduction ; GO:0035556'.

signal transducing protein tyrosine phosphatase activity ; GO:NEW
Functions to pass on a signal by catalysis of the reaction: protein tyrosine phosphate + H2O = protein tyrosine + phosphate. A signal is a physical entity or change in state that is used to transfer information in order to trigger a response. The phosphate group can be removed from itself or a downstream protein.
Comment: For gene products that signal downstream of a receptor, consider also annotating to 'intracellular signal transduction ; GO:0035556'.

signal transducing protein histidine kinase activity ; GO:NEW
Functions to pass on a signal by catalysis of the reaction: ATP + protein L-histidine = ADP + protein phospho-L-histidine.. A signal is a physical entity or change in state that is used to transfer information in order to trigger a response. The phosphate group can be removed from itself or a downstream protein.
Comment: For gene products that signal downstream of a receptor, consider also annotating to 'intracellular signal transduction ; GO:0035556'.
(NB: This term is not to replace an existing term, but is needed to complete the set).

Proposed Revisions: MERGES into parents

MERGE INTO SIGNAL TRANSDUCER ACTIVITY: receptor signaling protein activity ; GO:0005057

MERGE: receptor signaling protein serine/threonine kinase activity ; GO:0004702
Merge into: signal transducing protein serine/threonine kinase activity ; GO:NEW

MERGE: receptor signaling protein serine/threonine phosphatase activity ; GO:0009400
Merge into: signal transducing protein serine/threonine phosphatase activity ; GO:NEW

OBSOLETE: receptor signaling protein tyrosine kinase activity ; GO:0004716
Merge into: signal transducing protein tyrosine kinase activity ; GO:NEW

OBSOLETE: receptor signaling protein tyrosine phosphatase activity ; GO:0004728
Merge into: signal transducing protein tyrosine phosphatase activity ; GO:NEW

NB: Have created new terms rather than renaming the old terms, because the meaning of the new terms is broader so deserves a new ID.

NB: Haven't obsoleted the old terms, to save curators having to remap lots of their annotations. A new ID should flag that the definition is changed so they can look at them IF THEY HAVE TIME, but it's not compulsory.

TM receptor AND receptor signaling protein proposals combined