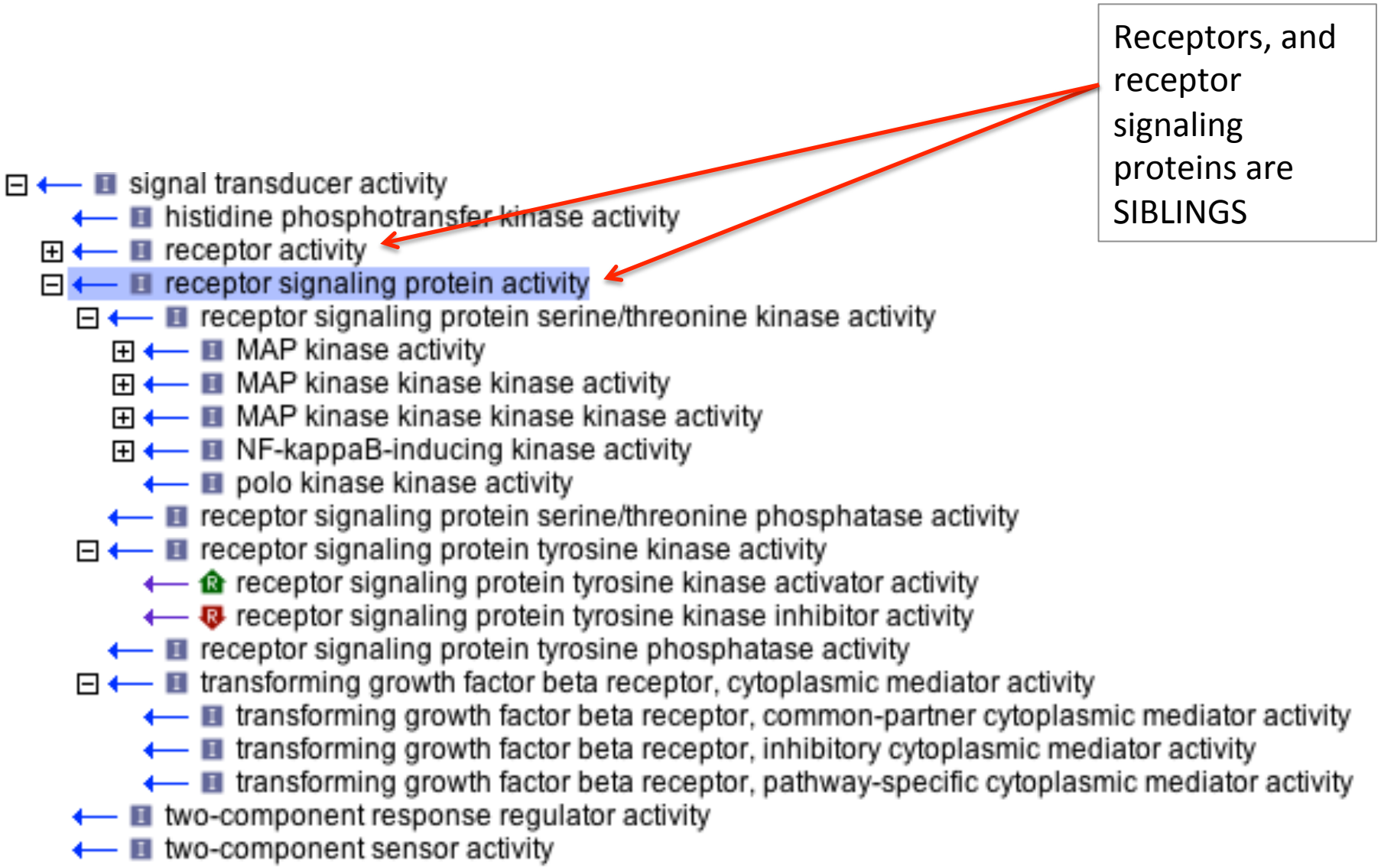
PROPOSAL TO CLEAN UP RECEPTOR SIGNALING PROTEIN ACTIVITY

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.

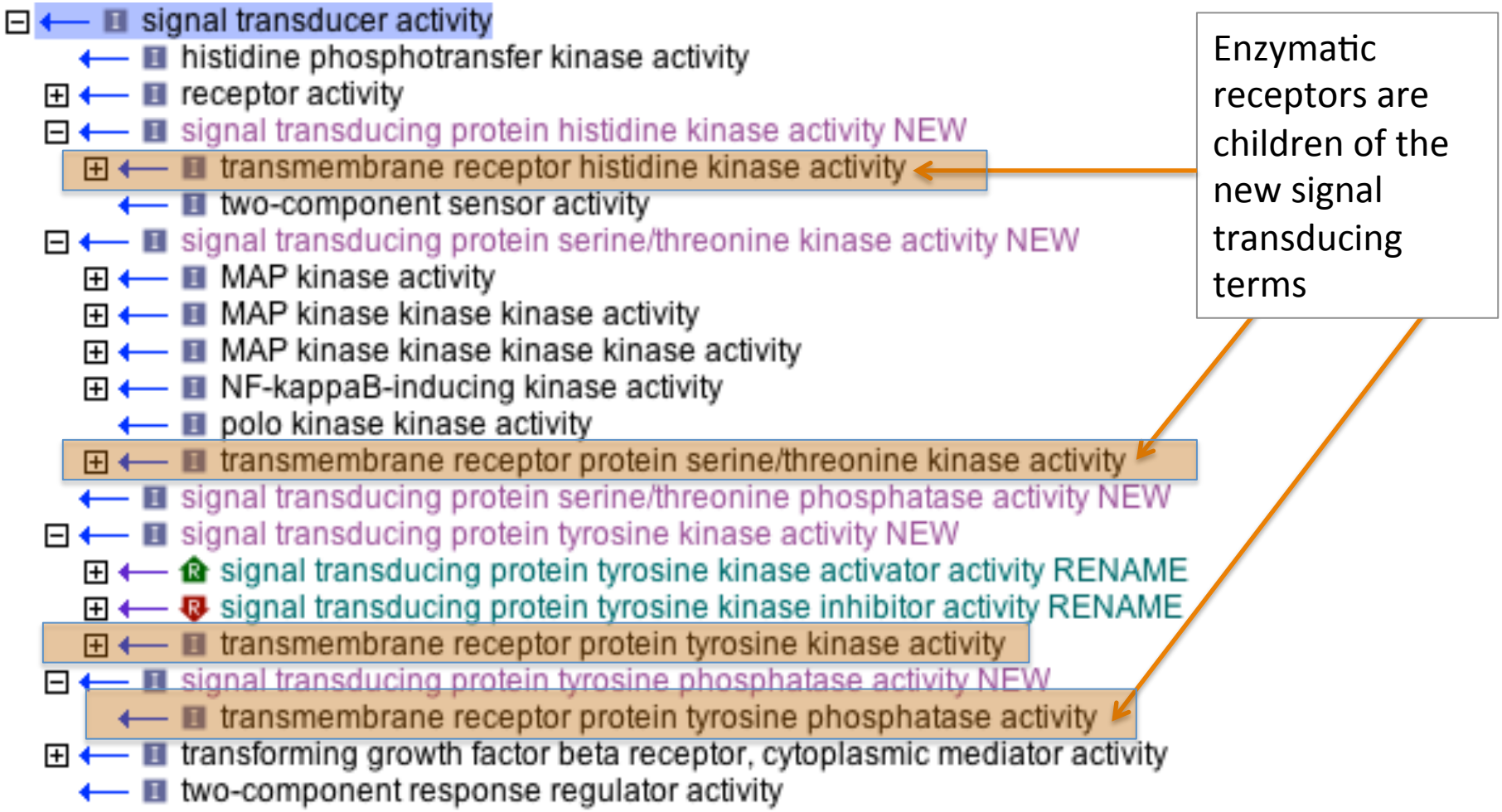
- The definition describes phosphorylation **OF** a receptor signaling protein (Many receptors phosphorylate receptor signaling proteins, so would be included in this definition).
- BUT I think the term is intended for annotation of downstream signaling proteins **THAT POSSESS** ser/thr kinase activity.

PROPOSAL

OUTLINE OF PROPOSAL

- Obsolete existing ‘receptor signaling protein x kinase activity’ terms, and replace them with broader ‘signal transducing x kinase activity’ terms.

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



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.

Proposed Revisions: OBSOLETIONS

OBSOLETE: receptor signaling protein activity ; GO:0005057
Comment: This term was made obsolete because its meaning is ambiguous.
Consider: signal transducer activity ; GO:0004871
Consider: intracellular signal transduction ; GO:0035556

OBSOLETE: receptor signaling protein serine/threonine kinase activity ; GO:0004702
Comment: This term was made obsolete because its meaning is ambiguous.
Replaced with: signal transducing protein serine/threonine kinase activity ; GO:NEW
Consider: intracellular signal transduction ; GO:0035556

OBSOLETE: receptor signaling protein serine/threonine phosphatase activity ; GO:0009400
Comment: This term was made obsolete because its meaning is ambiguous.
Replaced with: signal transducing protein serine/threonine phosphatase activity ; GO:NEW
Consider: intracellular signal transduction ; GO:0035556

OBSOLETE: receptor signaling protein tyrosine kinase activity ; GO:0004716
Comment: This term was made obsolete because its meaning is ambiguous.
Replaced with: signal transducing protein tyrosine kinase activity ; GO:NEW
Consider: intracellular signal transduction ; GO:0035556

OBSOLETE: receptor signaling protein tyrosine phosphatase activity ; GO:0004728
Comment: This term was made obsolete because its meaning is ambiguous.
Replaced with: signal transducing protein tyrosine phosphatase activity ; GO:NEW
Consider: intracellular signal transduction ; GO:0035556

NB: Obsoleting terms rather than renaming, because the new terms have a broader meaning, and some annotations could be transferred to the more specific receptor terms.

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).

TM receptor AND receptor signaling protein proposals combined