**Source:** Elizabeth Specht, Stephen Mayfield Lab, University of California San Diego

**Plasmid name:** pHR23

**Vector:** pBluescript

**Host strain:** DH5a *E. coli*

**Origin:** Created by seamless cloning of several different fragments; fully sequence-verified.

**Insert:** This plasmid contains 4,360bp of homology to its complementing partner, pHR18, followed by one intact cassette for paromomycin resistance and one truncated cassette. The truncated cassette contains the 5’ half of the hygromycin resistance CDS, preceded by the beta-tubulin promoter and 5’ UTR, followed by a 1.6kb intron amplified from wild type strain CC1010 genomic DNA.

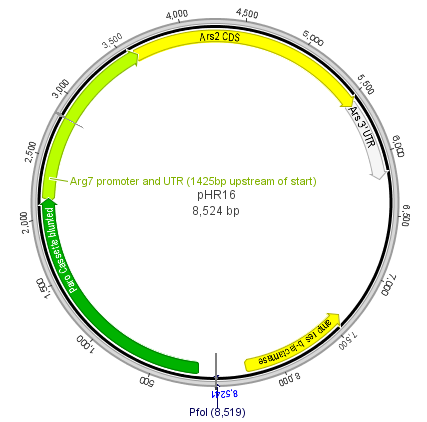
Total insert size is 8,847 bp.

**Selection:** Ampicillin resistant in *E. coli*; paromomycin resistant in *Chlamydomonas.*

**Comment:** This plasmid represents one half of the pair of plasmids designed to detect homologous recombination in *C. reinhardtii.* Upon recombination with its partner, pHR18, it will produce an intact, functional hygromycin resistance cassette. pHR23 can be transformed directly into strain B12, which already harbors pHR18 in its genome, to screen for homologous recombination rate. Paromomycin resistance can be used to assess the ratio of recombinants to total transformation efficiency.

**Reference:** Currently under review for publication.

**Plasmid Map:**



**Sequence (see also .gb file with all annotations in the sequence):**

GACGGTCACAGCTTGTCTGTAAGCGGATGCCGGGAGCAGACAAGCCCGTCAGGGCGCGTCAGCGGGTGTTGGCGGGTGTCGGGGCTGGCTTAACTATGCGGCATCAGAGCAGATTGTACTGAGAGTGCACCATAGGGCGGCCGCCAGCTGGAATTCATCCCACACACCTGCCCGTCTGCCTGACAGGAAGTGAACGCATGTCGAGGGAGGCCTCACCAATCGTCACACGAGCCCTCGTCAGAAACACGTCTCCGCCACGCTCTCCCTCTCACGGCCGACCCCGCAGCCCTTTTGCCCTTTCCTAGGCCACCGACAGGACCCAGGCGCTCTCAGCATGCCTCAACAACCCGTACTCGTGCCAGCGGTGCCCTTGTGCTGGTGATCGCTTGGAAGCGCATGCGAAGACGAAGGGGCGGAGCAGGCGGCCTGGCTGTTCGAAGGGCTCGCCGCCAGTTCGGGTGCCTTTCTCCACGCGCGCCTCCACACCTACCGATGCGTGAAGGCAGGCAAATGCTCATGTTTGCCCGAACTCGGAGTCCTTAAAAAGCCGCTTCTTGTCGTCGTTCCGAGACATGTTAGCAGATCGCAGTGCCACCTTTCCTGACGCGCTCGGCCCCATATTCGGACGCAATTGTCATTTGTAGCACAATTGGAGCAAATCTGGCGAGGCAGTAGGCTTTTAAGTTGCAAGGCGAGAGAGCAAAGTGGGACGCGGCGTGATTATTGGTATTTACGCGACGGCCCGGCGCGTTAGCGGCCCTTCCCCCAGGCCAGGGACGATTATGTATCAATATTGTTGCGTTCGGGCACTCGTGCGAGGGCTCCTGCGGGCTGGGGAGGGGGATCTGGGAATTGGAGGTACGACCGAGATGGCTTGCTCGGGGGGAGGTTTCCTCGCCGAGCAAGCCAGGGTTAGGTGTTGCGCTCTTGACTCGTTGTGCATTCTAGGACCCCACTGCTACTCACAACAAGCCAAAATGGACGATGCGTTGCGTGCACTGCGGGGTCGGTATCCCGGTTGTGAGTGGGTTGTTGTGGAGGATGGGGCCTCGGGGGCTGGTGTTTATCGGCTTCGGGGTGGTGGGCGGGAGTTGTTTGTCAAGGTGGCAGCTCTGGGGGCCGGGGTGGGCTTGTTGGGTGAGGCTGAGCGGCTGGTGTGGTTGGCGGAGGTGGGGATTCCCGTACCTCGTGTTGTGGAGGGTGGTGGGGACGAGAGGGTCGCCTGGTTGGTCACCGAAGCGGTTCCGGGGCGTCCGGCCAGTGCGCGGTGGCCGCGGGAGCAGCGGCTGGACGTGGCGGTGGCGCTCGCGGGGCTCGCTCGTTCGCTGCACGCGCTGGACTGGGAGCGGTGTCCGTTCGATCGCAGTCTCGCGGTGACGGTGCCGCAGGCGGCCCGTGCTGTCGCTGAAGGGAGCGTCGACTTGGAGGATCTGGACGAGGAGCGGAAGGGGTGGTCGGGGGAGCGGCTTCTCGCCGAGCTGGAGCGGACTCGGCCTGCGGACGAGGATCTGGCGGTTTGCCACGGTCACCTGTGCCCGGACAACGTGCTGCTCGACCCTCGTACCTGCGAGGTGACCGGGCTGATCGACGTGGGGCGGGTCGGCCGTGCGGACCGGCACTCCGATCTCGCGCTGGTGCTGCGCGAGCTGGCCCACGAGGAGGACCCGTGGTTCGGGCCGGAGTGTTCCGCGGCGTTCCTGCGGGAGTACGGGCGCGGGTGGGATGGGGCGGTATCGGAGGAAAAGCTGGCGTTTTACCGGCTGTTGGACGAGTTCTTCTGAGCGTTCTGGCAGCAGCTGGACCGCCTGTACCATGGAGAAGAGCTTTACTTGCCGGGATGGCCGATTTCGCTGATTGATACGGGATCGGAGCTCGGAGGCTTTCGCGCTAGGGGCTAGGCGAAGGGCAGTGGTGACCAGGGTCGGTGTGGGGTCGGCCCACGGTCAATTAGCCACAGGAGGATCAGGGGGAGGTAGGCACGTCGACTTGGTTTGCGACCCCGCAGTTTTGGCGGACGTGCTGTTGTAGATGTTAGCGTGTGCGTGAGCCAGTGGCCAACGTGCCACACCCATTGAGAAGACCAACCAACTTACTGGCAATATCTGCCAATGCCATACTGCATGTAATGGCCAGGCCATGTGAGAGTTTGCCGTGCCTGGAATTCGCTGAGGGTTTAATGTCGACGAGGAGGAGGTGCAAGGGGGATACCAGCGCGTGTTTCTCAGGGCCTGTGTGGGACACCGAAACGTGGTAAAAGAGACCCGCCCGCGAACTGTGTATGTGGAGTAGCGTGGCGTGTGCGGCCGGACCGACAAGGCAGCTTGTGGACTGCCCCACGTTGCAGAGTCAGCTGACAACGACACGTGCGCCTTCCTGTCATTGCCCGTGCGCACGCACGTCCTCCGCACTCCCAACAAATTGACAGCGACACGTGCGCCTTCCTATAAGCCTATGCCCGCACACGCTCCCGCGCCCTCAGGTGTCGGGCCAGACCACAGACCGGTTGGTCCACGAGTGCGAGGAGGATGAGGCGGGCGGCTGCGGCGGCGCCGGCGGGGCGGCGGGCGGCGAGGAGGACGGCCTGGGACTGGGCATCACAGGTGGGTGGCAGGCTGGCAGGGACTCACGCATGGGCCTTGTACGTGACTGCGGTTCTGCATGGCTAGTGGCTCACGCGCTGCGCACGTTCACGTACGGCTTGTGGGCATGCAGTGCCTTGACGTGAGGCTGCGCTGCCTTGCTGCTGCCGCCTTGCCCCGCTCCCTGCACACACTGCAGCCGGCTTCGGGCGCTACTTCACCGCGGGCTACGAGTGCGAGAACGCGCAGCAGCTCAACAGGCTGCTGGGGTACAAGGCGCTGTGAGAGCGCGCCGCAGGGGGAGTGTGTTCATATTGTGGTTGTTTGGGCCGTGGGCGCGGGCTGCATGTGCGTATTGCACGCGTACAGCATTGGTGACTGGTCAGGTGTAAGCGGCCGGCAGTGCGCCGCGAGGCGCTGCAGCGAGTTGTGGGGCATGCGTCATGCGCAGACGGCCCCTGGACGACAAGGCGTTGAGTTGGCGTTTGGAGGTGTGGGACGACGTGGGGTTTGTGCCGTCAAAGCACAGAACAGAAGGCGTGACCGTTTTACGAGCTCGTATGATGTAGCATGGATTGAATAATGACATGTGATTTTTGTTACAAGCGACGAATGCGTGGGGTTTTGGATGGCAGGGGTTTCAGTCGCCCGATTGCGCATGCACACGTGACCAAATTTATGCTCAACGACGTGACCATTGCTTTATACATACTTGTGTATCGGTTGGCACTTATAACAATTGGCTCGTCAAATTGACGCGAGGCTGCACTTCGATCCTGAAAGCCCCAGTTCAACAAGTCGGATAGCCAAATGGCCCCGCTCGCTCTCCAGCATCAAGGGGCCTCTAAGTGCCTCGCGGCAACCCAGCGCAAGTGTGCTCGCGTTGCGGTGAGCTGGACTCGTGCACTTGTCGACGCCGTCGGCACCGCAATCGAAAGACGCGTGCGTCGAGCAATTGTGGAAGCCGCTGACGAATTGTCCGCATGTGACATTGCAGGCTCGCGTCCCCGCTCGTCTCAGCGTCATGGGTGCCCTCGCGGTGTTCGCCGTCGCTTGCCTCGCGGCAGTGGCGTCGGTTGCGCATGCGGCCGACACCAAAAAGCCCAACTTTGTGGTGATCTTCACCGATGACCAGGACGCCATTCAGAACAGCACCCACCCGCACTACATGCCCAGCCTGCACAAGTACATCCGCTACCCGGGAGTGGAGCTGTCTCAGTACTTCGTCACCACCCCCGTGTGCTGCCCCTCGCGGACAAACCTGTGGCGCGGCCAGTTCGCCCACAACACCAACTTCACCAGCGTGCTGCCTCCCTACGGTGGCTGGGCCAAGTGGAAGGGCCTGGGCATCGACCAGTCCTACCTGCCGCTGTGGCTCAAGGACCAAGGCTATAACACCTACTACGTGGGCAAGTTCCTTGTGGACTACTCGGTCAGCAACTACCAGCAGGTGCCCGCGGGCTGGGACGACATCGATGCCCTGGTCACCCCCTACACCTTTGACTACAACACCCCCGGCTTCAGCCGCAACGGCGCGACCCCCAACATCTACCCCGGCGAGTACAGCACTGACGTCATTCGCGACAAGGGCATTGCTCAGATCAAGTCGGCCGTGGCTGCCGGAAAGCCCTTCTACGCGCAGATCTCGCCCATCGCGCCGCACACCTCCACCCAGATTTCCACCGACCCCGTCACCGGAGTGACGAGGTCCTTCTTCTACCCGCCCATCCCCGCCCCCCGCCACTGGCAGCTGTTCTCCGACGCCAACCTGCCCGGCGGCACGCCCAACAAGAACCTGTACGAGGTGGACGTGAGCGACAAGCCCGCCTGGGTCCGCGCCCTGCCGCTGGCCCAGCAGAACAACCGCACCTACCTGGAGGAGATCTACCGCCTGCGCCTGAGGTCGCTGGCGGCCGTGGACGAGCTGATTGAGCAAGTCGTCAAGACCCTGGATGAGGCGGGTGTGCTTGACAACACCTACATCATCTACAGCGCTGACAACGGCTACCACGTGGGTGCCCACCGCTTCGGCGCGGGCAAGACCACGGGCTATGAGGAGGACCTGCGTGTGCCCTTCCTCATCCGCGGCCCAGGCATCAAGGCCAGCCAGTCCGACAAGCCGCAGAACAGCAAGGTTGGCCTGCACGTGGACTTTGCGCCCACCATTCTCAGCCTGGCCGGCGCCTCGCACCTGCTCGGGGACAAGGGGCTGGACGGCACCCCGCTGGGCCTGTACGCCAACGACGACGGCACTCTTCGCTCCGACTACCCTCGTCCGGAGCAGCACCGCCAGCAGTTCCAGGGCGAGTTCTGGGGCGGCTGGAGTGATGAGCTGCTGCAGAACCTCAGGTCCCAGCCCAACAACACTTGGAAGGTGGTGCGCACGTATGACGAGAGCAGCAAGCAGGGATGGAAGCTCATCGCGCAGTGCACCAACGAGCGCGAGCTGTACGACCTGCGCAAGGACCCCGGTGAGCTGTACAACATCTACGACAAGGCCAAGCCCGCCGTGCGCAGCCGCCTGGAGGGGCTGCTGGCGGTGCTGGCCGTGTGCAAGGGGGAGAGCTGCTCCAACCCGTGGAAGATCCTGCACCCCGACGGCACCGTCAAGAACTTCACCCAGGCACTCAACTCCAAGTACGACCGCATCTACAACGCAATCCGCCCCTTCACCTACAAGACGTGCCTGCAGTACCTGGATTGGGACAACGAGGACAGTCAGTTTAAGACGCAGATCCGCGGCGCCAACCCCGCAGCCGGCGTGGGCCACCACCGCCTGCTCACCGCCGCCAGCGAGCGCGCCATCGCCACCCGCCGCCGCGCCCAGGCCGCCGTCAGTGCCGAGCTGGCGGAGCGGCCGGCTGTGTTCCAGGCAAAGGTCGAGGAGAAGTCGGTGCCGGTGCCCCAGGACATCCTGAAGGCCGACGTGGAGAAGTGGTTCGCCTTCAACAATGCCGAGTACTACCTGGCTTAGATGGTCGATATTATATAAAAGCCAATGCAAGCGCGCATGGACATAGCGCATCGACCAAGCGCCACCATGGCTTGGGTTTCTTTGATACGGTTGGGCTAAGTTTGATATGTGGGTTTTGGACGTGGCCGCTTGGTCAGTAAGCGGTCCACGTGGTAATGCCGTGTGCGTGATCCCCCCTGGAGTGGTGTTGGGGTAGGTTAATGACAAGGTAAAGCAGTGGGTACATGCACGCACAATTGCGTCGGACAGAAGAGTACCGGGACGTGATCCATGAAGAAATGGTATAAGGCGCCTCATGCATCCGTAGATGGCGCTCACGTGCGCTTAATTGCATGCGCGCCGTCACTTGTTTGTTGATTGCGGAATTAAGTGGTTAGGCCACTTGGTTGCGAAGAGTGTTGTGCGCCGCCCTCGGTAGTTCGGTGCGCCGCTGGAAACTTGCGTTGGTGTTCTGAGCTGCGGAGCTCTGGTTGGTCACTTGGTCTGCTGTTGTGCCTGTATGTTAAGAGGTGCTGGGTAAAGAAGTGGGCTTGCGTGGATGTTGACTGGCTGGCAGATAGGACTGTGCAGCGGCCTTGCTGCCGCGTGGTAAAGACTGAGAAAGGTATGTACCCGGCGTGGTGCCATGGAGCCATGGAACGAAGCATTAAGACCTCAGCCTGCAGAGTACTGCGGCCGCGAGCTTGGCGTAATCATGGTCATAGCTGTTTCCTGTGTGAAATTGTTATCCGCTCACAATTCCACACAACATACGAGCCGGAAGCATAAAGTGTAAAGCCTGGGGTGCCTAATGAGTGAGCTAACTCACATTAATTGCGTTGCGCTCACTGCCCGCTTTCCAGTCGGGAAACCTGTCGTGCCAGCTGCATTAATGAATCGGCCAACGCGCGGGGAGAGGCGGTTTGCGTATTGGGCGCTCTTCCGCTTCCTCGCTCACTGACTCGCTGCGCTCGGTCGTTCGGCTGCGGCGAGCGGTATCAGCTCACTCAAAGGCGGTAATACGGTTATCCACAGAATCAGGGGATAACGCAGGAAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCCAGGAACCGTAAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACTATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGCGCTCTCCTGTTCCGACCCTGCCGCTTACCGGATACCTGTCCGCCTTTCTCCCTTCGGGAAGCGTGGCGCTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTCGCTCCAAGCTGGGCTGTGTGCACGAACCCCCCGTTCAGCCCGACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTGTTTGCAAGCAGCAGATTACGCGCAGAAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGGAACGAAAACTCACGTTAAGGGATTTTGGTCATGAGATTATCAAAAAGGATCTTCACCTAGATCCTTTTAAATTAAAAATGAAGTTTTAAATCAATCTAAAGTATATATGAGTAAACTTGGTCTGACAGTTACCAATGCTTAATCAGTGAGGCACCTATCTCAGCGATCTGTCTATTTCGTTCATCCATAGTTGCCTGACTCCCCGTCGTGTAGATAACTACGATACGGGAGGGCTTACCATCTGGCCCCAGTGCTGCAATGATACCGCGAGACCCACGCTCACCGGCTCCAGATTTATCAGCAATAAACCAGCCAGCCGGAAGGGCCGAGCGCAGAAGTGGTCCTGCAACTTTATCCGCCTCCATCCAGTCTATTAATTGTTGCCGGGAAGCTAGAGTAAGTAGTTCGCCAGTTAATAGTTTGCGCAACGTTGTTGCCATTGCTACAGGCATCGTGGTGTCACGCTCGTCGTTTGGTATGGCTTCATTCAGCTCCGGTTCCCAACGATCAAGGCGAGTTACATGATCCCCCATGTTGTGCAAAAAAGCGGTTAGCTCCTTCGGTCCTCCGATCGTTGTCAGAAGTAAGTTGGCCGCAGTGTTATCACTCATGGTTATGGCAGCACTGCATAATTCTCTTACTGTCATGCCATCCGTAAGATGCTTTTCTGTGACTGGTGAGTACTCAACCAAGTCATTCTGAGAATAGTGTATGCGGCGACCGAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCGCCACATAGCAGAACTTTAAAAGTGCTCATCATTGGAAAACGTTCTTCGGGGCGAAAACTCTCAAGGATCTTACCGCTGTTGAGATCCAGTTCGATGTAACCCACTCGTGCACCCAACTGATCTTCAGCATCTTTTACTTTCACCAGCGTTTCTGGGTGAGCAAAAACAGGAAGGCAAAATGCCGCAAAAAAGGGAATAAGGGCGACACGGAAATGTTGAATACTCATACTCTTCCTTTTTCAATATTATTGAAGCATTTATCAGGGTTATTGTCTCATGAGCGGATACATATTTGAATGTATTTAGAAAAATAAACAAATAGGGGTTCCGCGCACATTTCCCCGAAAAGTGCCACCTGACGTCTAAGAAACCATTATTATCATGACATTAACCTATAAAAATAGGCGTATCACGAGGCCCTTTCGTCTCGCGCGTTTCGGTGATGACGGTGAAAACCTCTGACACATGCAGCTCCCGGA