

Supporting Information

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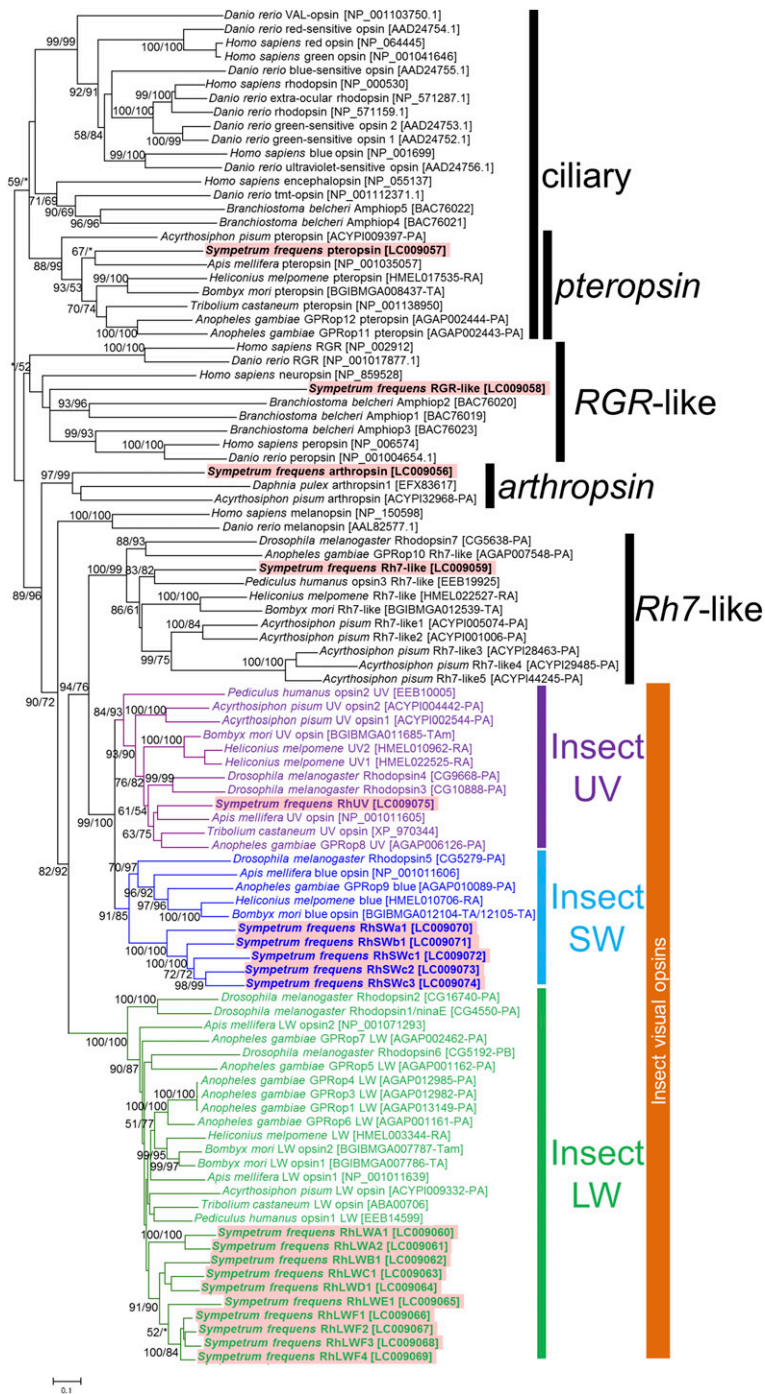


Fig. S1. Phylogenetic relationship of 20 opsin genes of the red dragonfly *Sympetrum frequens* (red shade) to opsin genes of diverse insects and other animals. A neighbor-joining phylogeny inferred from 858 aligned amino acid sites is shown, and maximum-likelihood phylogeny exhibited substantially similar topologies. On each node, bootstrap values are indicated in the order of neighbor-joining method/maximum-likelihood method. Asterisks indicate support values lower than 50%. Accession numbers or annotation IDs are in brackets. Classification of the opsin genes is indicated on the right side. Insect visual opsin genes are highlighted in purple for UV type, in blue for short-wavelength (SW) type, and in green for long-wavelength (LW) type, respectively.

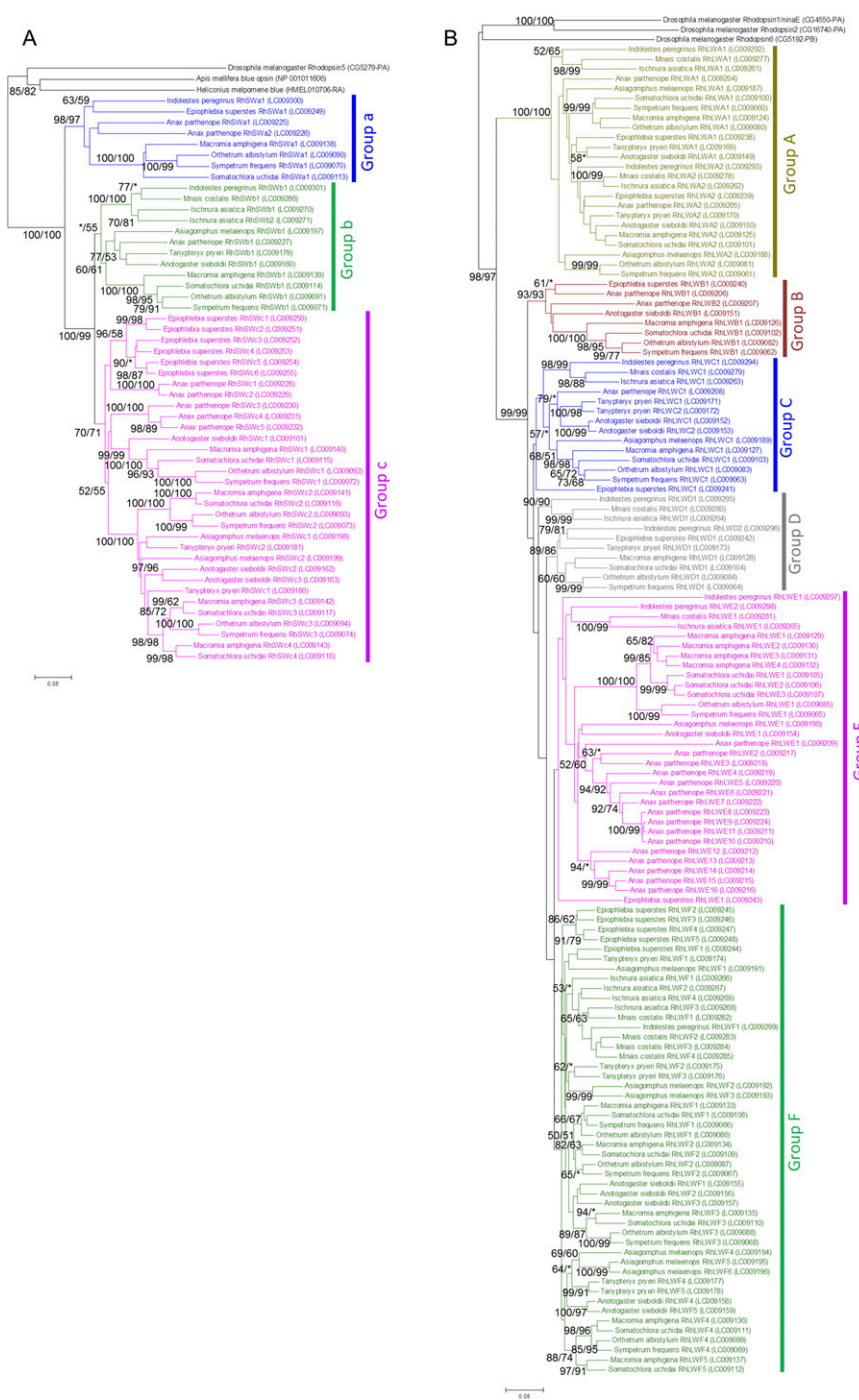


Fig. 52. Molecular phylogenetic analyses of visual opsin genes of SW type and LW type identified from diverse dragonfly species examined in this study. (A) A neighbor-joining phylogeny of SW opsin genes inferred from 409 aligned amino acid sites. (B) A neighbor-joining phylogeny of LW opsin genes inferred from 404 aligned amino acid sites. Bootstrap values are indicated at the nodes in the order of neighbor-joining method/maximum-likelihood method. Asterisks indicate support values lower than 50%. Visual opsin groups are shown on the right side in different colors. Accession numbers or annotation IDs are in parentheses.

Table S1. Dragonfly samples and RNA sequencing reads

Species	Locality*	Date	Coll [†]	Tissue [‡]	No. of pairs	HiSeq/MiSeq	Accession no.
<i>Sympetrum frequens</i>	Tsukuba, Ibaraki	10/06/12	RF	Adult DCE	5,923,205	HiSeq 100 bp paired	DRA001792
	Tsukuba, Ibaraki	10/11/14	RF	Adult DCE	1,010,242	MiSeq 300 bp paired	DRA002790
	Tsukuba, Ibaraki	10/06/12	RF	Adult VCE	7,123,105	HiSeq 100 bp paired	DRA001793
	Tsukuba, Ibaraki	10/10/14	RF	Adult VCE	1,178,286	MiSeq 300 bp paired	DRA002791
	Ishioka, Ibaraki	06/10/14	RF	Adult ocelli	10,571,567	HiSeq 100 bp paired	DRA002482
	Ishioka, Ibaraki	06/10/14	RF	Adult ocelli	12,768,046	HiSeq 100 bp paired	DRA002485
	Ishioka, Ibaraki	06/10/14	RF	Larval head	7,272,069	HiSeq 100 bp paired	DRA002486
	Ishioka, Ibaraki	06/10/14	RF	Larval head	2,857,714	MiSeq 300 bp paired	DRA002781
<i>Orthetrum albistylum</i>	Tsukuba, Ibaraki	07/19/13	RF	Adult DCE	13,967,030	HiSeq 100 bp paired	DRA001714
	Tsukuba, Ibaraki	06/30/14	RF	Adult DCE	6,071,312	HiSeq 100 bp paired	DRA002456
	Tsukuba, Ibaraki	07/19/13	RF	Adult VCE	14,111,614	HiSeq 100 bp paired	DRA001715
	Tsukuba, Ibaraki	06/30/14	RF	Adult VCE	8,243,762	HiSeq 100 bp paired	DRA002457
	Tsukuba, Ibaraki	06/30/14	RF	Adult ocelli	7,588,324	HiSeq 100 bp paired	DRA002458
	Tsukuba, Ibaraki	06/30/14	RF	Adult ocelli	2,429,276	MiSeq 300 bp paired	DRA002806
	Tsukuba, Ibaraki	07/19/13	RF	Larval head	9,934,714	HiSeq 100 bp paired	DRA001718
	Fuchu, Toyama	05/25/14	HF	Larval head	7,312,210	HiSeq 100 bp paired	DRA002459
<i>Somatochlora uchidai</i>	Osawano, Toyama	06/29/14	OS	Adult DCE	1,713,912	MiSeq 300 bp paired	DRA002773
	Osawano, Toyama	06/29/14	OS	Adult VCE	1,693,986	MiSeq 300 bp paired	DRA002774
	Osawano, Toyama	06/29/14	OS	Adult ocelli	1,672,847	MiSeq 300 bp paired	DRA002775
	Shogawa, Toyama	06/15/14	HF	Larval head	1,233,017	MiSeq 300 bp paired	DRA002776
	Shogawa, Toyama	09/05/12	HF	Adult head	13,317,560	HiSeq 100 bp paired	DRA001780
<i>Macromia amphigena</i>	Ishioka, Ibaraki	06/10/14	RF	Adult DCE	2,163,042	MiSeq 300 bp paired	DRA002777
	Ishioka, Ibaraki	06/10/14	RF	Adult VCE	2,547,572	MiSeq 300 bp paired	DRA002778
	Ishioka, Ibaraki	06/10/14	RF	Adult ocelli	2,288,712	MiSeq 300 bp paired	DRA002779
	Hitachiota, Ibaraki	06/20/14	RF	Larval head	1,948,611	MiSeq 300 bp paired	DRA002780
<i>Anotogaster sieboldii</i>	Osawano, Toyama	06/12/13	HF	Adult head	20,059,678	HiSeq 100 bp paired	DRA002395
	Osawano, Toyama	06/08/14	OS	Adult DCE	13,298,123	HiSeq 100 bp paired	DRA002490
	Osawano, Toyama	06/08/14	OS	Adult VCE	14,045,045	HiSeq 100 bp paired	DRA002491
	Osawano, Toyama	06/08/14	OS	Adult ocelli	14,165,214	HiSeq 100 bp paired	DRA002487
	Fuchu, Toyama	05/11/14	HF	Larval head	13,333,786	HiSeq 100 bp paired	DRA002489
<i>Tanypteryx pryeri</i>	Tsukuba, Ibaraki	09/06/12	RF	Adult head	11,412,005	HiSeq 100 bp paired	DRA001779
	Fuchu, Toyama	05/13/14	HF	Adult DCE	6,325,017	HiSeq 100 bp paired	DRA002497
	Fuchu, Toyama	05/13/14	HF	Adult VCE	12,112,423	HiSeq 100 bp paired	DRA002498
	Fuchu, Toyama	05/13/14	HF	Adult ocelli	16,382,746	HiSeq 100 bp paired	DRA002499
	Fuchu, Toyama	06/02/14	HF	Larval head	1,702,766	MiSeq 300 bp paired	DRA002771
<i>Asiagomphus melaenops</i>	Kosugi, Toyama	06/11/14	HF	Adult DCE	17,414,315	HiSeq 100 bp paired	DRA002345
	Kosugi, Toyama	06/11/14	HF	Adult VCE	14,545,756	HiSeq 100 bp paired	DRA002346
	Kosugi, Toyama	06/11/14	HF	Adult ocelli	17,723,205	HiSeq 100 bp paired	DRA002347
	Fuchu, Toyama	05/11/14	HF	Larval head	15,526,427	HiSeq 100 bp paired	DRA002344
	Kosugi, Toyama	06/04/13	HF	Adult head	16,233,972	HiSeq 100 bp paired	DRA002343
<i>Anax parthenope</i>	Daimon, Toyama	06/08/14	HF	Adult DCE	9,868,671	HiSeq 100 bp paired	DRA002495
	Daimon, Toyama	06/08/14	HF	Adult VCE	7,086,216	HiSeq 100 bp paired	DRA002496
	Daimon, Toyama	06/08/14	HF	Adult ocelli	7,472,432	HiSeq 100 bp paired	DRA002492
	Fuchu, Toyama	06/07/14	HF	Larval head	12,223,100	HiSeq 100 bp paired	DRA002494
	Tsukuba, Ibaraki	09/06/12	RF	Adult head	14,338,966	HiSeq 100 bp paired	DRA001761
<i>Epiophlebia superstes</i>	Toyota, Aichi	06/04/13	TO	Adult DCE	15,005,865	HiSeq 100 bp paired	DRA001755
	Toyota, Aichi	06/04/13	TO	Adult VCE	12,759,491	HiSeq 100 bp paired	DRA001756
	Toyota, Aichi	06/04/13	TO	Adult ocelli	23,218,570	HiSeq 100 bp paired	DRA001757
	Izu, Shizuoka	05/16/13	MM	Larval head	16,087,287	HiSeq 100 bp paired	DRA001758
<i>Ichnura asiatica</i>	Tsukuba, Ibaraki	06/27/14	RF	Adult DCE	2,864,655	MiSeq 300 bp paired	DRA002766
	Tsukuba, Ibaraki	06/27/14	RF	Adult VCE	3,031,300	MiSeq 300 bp paired	DRA002767
	Tsukuba, Ibaraki	06/27/14	RF	Adult ocelli	4,717,947	MiSeq 300 bp paired	DRA002768
	Tsukuba, Ibaraki	06/19/14	RF	Larval head	5,178,312	MiSeq 300 bp paired	DRA002769
	Fukumitsu, Toyama	06/15/09	HF	Adult head	12,325,897	HiSeq 100 bp paired	DRA002352
	Fukumitsu, Toyama	06/15/09	HF	Adult head	13,226,569	HiSeq 100 bp paired	DRA002354
<i>Mnais costalis</i>	Yatsuo, Toyama	04/07/14	HF	Adult DCE	3,131,184	MiSeq 300 bp paired	DRA002761
	Yatsuo, Toyama	04/07/14	HF	Adult VCE	5,726,678	MiSeq 300 bp paired	DRA002762
	Yatsuo, Toyama	04/07/14	HF	Adult ocelli	4,462,057	MiSeq 300 bp paired	DRA002763
	Yatsuo, Toyama	04/02/14	HF	Larval head	4,713,722	MiSeq 300 bp paired	DRA002764
	Yatsuo, Toyama	04/21/09	HF	Adult head	3,418,080	HiSeq 100 bp paired	DRA002390
	Himi, Toyama	05/26/13	HF	Adult head	12,479,282	HiSeq 100 bp paired	DRA002393

Table S1. Cont.

Species	Locality*	Date	Coll [†]	Tissue [‡]	No. of pairs	HiSeq/MiSeq	Accession no.
<i>Indolestes peregrinus</i>	Ishioka, Ibaraki	06/10/14	RF	Adult DCE	7,842,957	HiSeq 100 bp paired	DRA002455
	Ishioka, Ibaraki	06/10/14	RF	Adult VCE	8,015,409	HiSeq 100 bp paired	DRA002460
	Ishioka, Ibaraki	06/10/14	RF	Adult ocelli	6,668,121	HiSeq 100 bp paired	DRA002461
	Tsukuba, Ibaraki	07/19/13	RF	Larval head	9,260,913	HiSeq 100 bp paired	DRA001744

*All localities are in Japan.

[†]Collector: HF, Hiroyuki Futahashi; MM, Makoto Machida; OS, Osamu Shimbori; RF, Ryo Futahashi; TO, Tooru Oono.

[‡]DCE, dorsal compound eyes; head, whole head; ocelli, head region with ocelli; VCE, ventral compound eyes.

Other Supporting Information Files

[Dataset S1 \(XLSX\)](#)