



## A catalog and assessment of Prof. Hideji Yamaguchi's slide collection of branchiobdellidans (Annelida: Clitellata) with the identification of syntypes

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### Abstract

The branchiobdellidan slide collection of Professor Hideji Yamaguchi was rediscovered in 1995; however, all of the written records associated with it appear to have been lost. The slide collection has been examined, cataloged and deposited in the Invertebrate Collection of the Hokkaido University Museum, Sapporo, Japan (ICHAM). The collection was found to contain whole mounted specimens of all 17 species described by Prof. Yamaguchi, together with specimens of three other Oriental species described after his death. In addition, mounted specimens of some of these species were designated syntypes. Many sectioned and stained specimens were also cataloged, but those were not identified to species at this time.

**Key Words:** Annelida, Clitellata, Branchiobdellida, taxonomy, catalog, East Asian distribution

### Introduction

Branchiobdellidans, or crayfish worms, are ectosymbiotic clitellate annelids that live primarily on freshwater Holarctic astacioidian crayfishes. Based on Bănărescu's (1990) zoogeographic organization, they have an endemic, disjunct distribution in the East Asian, Euro-Mediterranean, and eastern and western North American regions (Gelder 1999; Gelder & Williams 2016). The order Branchiobdellida Holt, 1965 is monophyletic (Williams *et al.* 2013) consisting of one family, Branchiobdellidae Grube, 1851 which is divided into five subfamilies (Brinkhurst & Gelder 2001) with about 150 species in 22 genera (Gelder 1996, 2011).

A detailed historical review of branchiobdellidans in Eastern Asia was given in Gelder & Ohtaka (2002) with subsequent studies being conducted by Gelder (2010), Niwa *et al.* (2005), Fujita *et al.* (2010), Ohtaka (2010), Ohtaka & Chen (2010), Ohtaka *et al.* (2012), Ohtaka & Gelder (2015), Ahn & Min (2016), Tanaka *et al.* (2016) and Kitayabu *et al.* (2016). Early studies of East Asian worms were based on poorly preserved specimens (Pierantoni 1912); however, Professor Hideji Yamaguchi (1932a, b, c, 1933, 1934) ensured that his material was free from such artifacts, thus resulting in 17 new species and some redescriptions that, together, formed the first comprehensive investigation of branchiobdellidans in East Asia. Unfortunately, he did not designate any type series for these species, nor state in which institution his material had been deposited. After Yamaguchi's death in 1970, it was believed that both his slides and his fluid-preserved specimen collection of branchiobdellidans had been lost and probably destroyed, until one of us (A.O.) found the slide collection in 1995 (Gelder & Ohtaka 2002).

A preliminary study of the slides revealed they consisted of whole mount and sectioned specimens with some having annotation. Unfortunately, no catalogs or recorded information accompanied the collection. Although many of the whole specimens could be identified to species, others labeled "unidentified" may still be named following further study. Yamaguchi's sections were of a high standard, but given the limited conditions at the time and without labels, these specimens had to be set aside for future study. Consequently,

the preliminary report (Gelder & Ohtaka 2002) contained a list of species thus far identified by the authors and a summary of other details then available. Additional details obtained since 2002 are included in this present paper: the collection—and particularly the sectioned material—remains to be fully investigated. To this end, the details included in our Table 1 were designed to assist future researchers by ensuring all the information currently available is not lost.

**TABLE 1.** Microscope slides of branchiobdellidans in the Prof. H. Yamaguchi collection. Each slide is arranged by its original box/slide number, assigned museum number, original slide markings, specimen(s) status, species identification and type status followed by the Japanese common name.

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
1. 2	ICHUM-1398	c.d.l. 3	sect.	-	-	-
1. 4	ICHUM-1399	E. 16 / Sp.E / D.1	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype	Nippon-zariganimimizu
1. 6	ICHUM-1400	A. 10 / A. / 107	WM 1	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
"	ICHUM-1401	"	WM 2	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
1. 8 *	ICHUM-1402	H. 4 **	WM	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
1. 9	ICHUM-1403	H. 5 / c.m.b.	sect.	-	-	-
1. 14	ICHUM-1404	H. 3 **	WM	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
1. 17	ICHUM-1405	H. - 14 **	WM 1	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
"	ICHUM-1406	"	WM 2	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
1. 19	ICHUM-1407	E. 11 / 2 / E. 2	sect.	-	-	-
1. 20*	ICHUM-1408	20	WM 1	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
"	ICHUM-1409	"	WM 2	<i>Cirrodrilus makinoi</i> (Yamaguchi, 1934)	syntype	Hime-zariganimimizu
1. 23	ICHUM-1410	Sp. E. 8 - 2	sect.	-	-	-
1. 25	ICHUM-1411	Sp. E. 9 - 2	sect.	-	-	-
1. 26	ICHUM-1412	Sp. E. 9 - 1	sect.	-	-	-
1. 27	ICHUM-1413	Sp. E. 8 - 4	sect.	-	-	-
1. 28	ICHUM-1414	Sp. E. 8 - 3	sect.	-	-	-
1. 29	ICHUM-1415	Sp. E. 8 - 1	sect.	-	-	-
1. 30	ICHUM-1416	Sp. E. 7 - 2	sect.	-	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
1. 31	ICHUM-1417	Sp. E. 7 - 1	sect.	-		-
1. 32	ICHUM-1418	Sp. E. 6 / (APF?) **	sect.	-		-
1. 33	ICHUM-1419	E. 5	sect.	-		-
1. 34	ICHUM-1420	E. 4	sect.	-		-
1. 35	ICHUM-1421	Sp. E 3	sect.	-		-
1. 36	ICHUM-1422	E. 2	sect.	-		-
1. 37	ICHUM-1423	E. 1 - 2	sect.	-		-
1. 38	ICHUM-1424	Sp E 1	sect.	-		-
1. 39	ICHUM-1425	c.m.b. 19 / 19	sect.	-		-
1. 40	ICHUM-1426	c.m.b 20 / 1 / 12-1	sect.	-		-
1. 41	ICHUM-1427	c.m.b.-20 / 2 / 12-2	sect.	-		-
1. 42	ICHUM-1428	c.m.b 20 - 3 / 12-3	sect.	-		-
1. 43	ICHUM-1429	c.m.b 21 / 10	sect.	-		-
1. 44	ICHUM-1430	K. 6 - 2	sect.	-		-
1. 46 *	ICHUM-1431	K 6 / 6	WM	<i>Hidejodrilus koreanus</i> (Pierantoni, 1912)	non-type	Yotsuyubi-zariganimimizu
1. 47	ICHUM-1432	K. 6 / 5	sect.	-		-
1. 48	ICHUM-1433	K. 6 / 4	sect.	-		-
1. 49	ICHUM-1434	K. 6 / 3 - 2	sect.	-		-
1. 50	ICHUM-1435	K. 6 / 3 - 1	sect.	-		-
1. 51	ICHUM-1436	F 3 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
1. 52 *	ICHUM-1437	F 4 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
1. 54	ICHUM-1438	F 6 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932) ?	syntype ?	Uchida-zariganimimizu ?
1. 56	ICHUM-1439	Sp. E / D.3 / E 15	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype ?	Nippon-zariganimimizu
1. 58	ICHUM-1440	H. 9 - 2 / H. K. 1 - 2	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
1. 59	ICHUM-1441	E. 19	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype ?	Nippon-zariganimimizu
1. 60	ICHUM-1442	c.d 1. / 1 / c.d 1	sect.	-	-	-
1. 61	ICHUM-1443	c.s. - 1	sect.	-	-	-
1. 62	ICHUM-1444	c.s. - 2	sect.	-	-	-
1. 63	ICHUM-1445	c.s. - 3	sect.	-	-	-
1. 64	ICHUM-1446	c.s. - 18	sect.	-	-	-
1. 65	ICHUM-1447	Sp. c.s. 4 - 2	sect.	-	-	-
1. 66	ICHUM-1448	Sp. c.s. 6 - 1	sect.	-	-	-
1. 67	ICHUM-1449	Sp. c.s. 6 - 2 **	sect.	-	-	-
1. 68	ICHUM-1450	Sp. c.s. 7	sect.	-	-	-
1. 69	ICHUM-1451	c.s. - 15	sect.	-	-	-
1. 70	ICHUM-1452	c.s. 9	sect.	-	-	-
1. 71	ICHUM-1453	c.s. - 10	sect.	-	-	-
1. 72	ICHUM-1454	c.s. - 11	sect.	-	-	-
1. 73	ICHUM-1455	c.s. - 12	sect.	-	-	-
1. 74	ICHUM-1456	c.s. - 14	sect.	-	-	-
1. 75	ICHUM-1457	c.s. - 13	sect.	-	-	-
1. 76	ICHUM-1458	Sp. c.s. - 5	sect.	-	-	-
1. 77	ICHUM-1459	c.s. - 17	sect.	-	-	-
1. 78	ICHUM-1460	E. 10	sect.	-	-	-
1. 79	ICHUM-1461	H. 20 - 2	sect.	-	-	-
1. 83	ICHUM-1462	H 9 - 1 / H 21 - 1	sect.	-	-	-
1. 86	ICHUM-1463	E 21	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype ?	Nippon-zariganimimizu
1. 88 *	ICHUM-1464	E 20	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype ?	Nippon-zariganimimizu
1. 92	ICHUM-1465	H. 10 - 1	sect.	-	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
1. 99	ICHUM-1466	K 6 / 7	WM	<i>Hidejiodrilus koreanus</i> (Pierantoni, 1912)	non-type	Yotsuyubi-zariganimimizu
2. 4	ICHUM-1348	4	WM	<i>Cambarincola okadai</i> Yamaguchi, 1933	paralectotype	Yadorimimizu
2. 6	ICHUM-1467	am 2 - 10	sect.	-	-	-
2. 8	ICHUM-1468	A 8	sect.	-	-	-
2. 9	USNM 186575	9	WM	<i>Cambarincola okadai</i> Yamaguchi, 1933	syntype	Yadorimimizu
2. 10 *	ICHUM-1349	10	WM	<i>Cambarincola okadai</i> Yamaguchi, 1933	paralectotype	Yadorimimizu
2. 12	ICHUM-1469	D. 11 - 1	sect.	-	-	-
2. 13	ICHUM-1470	D 12 / 1 / 4	sect.	-	-	-
2. 14	ICHUM-1471	D. 10 - 2	sect.	-	-	-
2. 15 *	ICHUM-1472	c.s 33 **	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1473	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1474	"	WM 3	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1475	"	WM 4	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
2. 16	ICHUM-1476	D. 10 - 1	sect.	-	-	-
2. 18	ICHUM-1477	18 / 2 - 9	sect.	-	-	-
2. 20 *	ICHUM-1347	20	WM	<i>Cambarincola okadai</i> Yamaguchi, 1933	lectotype	Yadorimimizu
2. 21	ICHUM-1478	A. 7 / H	sect.	-	-	-
2. 22	ICHUM-1479	D. 9 - 2 / 3	sect.	-	-	-
2. 23	ICHUM-1480	c.m.b. 7 - 2	sect.	-	-	-
2. 26 *	ICHUM-1481	26	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype ?	Nippon-zariganimimizu

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
2. 29	ICHUM-1482	5 - 2	sect.	-		-
2. 32	ICHUM-1483	A 6 - 2	sect.	-		-
2. 34	ICHUM-1484	III / c.d.s 16	sect.	-		-
2. 35	ICHUM-1485	II / c.d.s 11	sect.	-		-
2. 36	ICHUM-1486	I / c.d.s 16	sect.	-		-
2. 40	ICHUM-1487	c. d. s. / (?) / c d s / 14	sect.	-		-
2. 41	ICHUM-1488	8	sect.	-		-
2. 43	ICHUM-1489	43	WM	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
2. 44	ICHUM-1490	10 / D 5	sect.	-		-
2. 46	ICHUM-1491	8	sect.	-		-
2. 48	ICHUM-1492	D / 2. 2 - 3 / D.- 8 - 3	sect.	-		-
2. 49	ICHUM-1493	49	WM	unidentified		-
2. 50	ICHUM-1494	Sp.cmb / D.1	WM 1	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
"	ICHUM-1495	"	WM 2	unidentified		-
"	ICHUM-1496	"	WM 3	unidentified		-
2. 54	ICHUM-1497	54 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
2. 55	ICHUM-1498	3 / D 5	sect.	-		-
2. 56	ICHUM-1499	c.m.b. 2	sect.	-		-
2. 57	ICHUM-1500	D. 9 - 1	sect.	-		-
2. 58	ICHUM-1501	D. 6 - 6	sect.	-		-
2. 59	ICHUM-1502	D. 6 - 5	sect.	-		-
2. 60 *	ICHUM-1503	59	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
2. 61	ICHUM-1504	61 **	-	-		-
2. 62	ICHUM-1505	c.m.b. / 62	sect.	-		-
2. 63	ICHUM-1506	F 2 **	sect.	-		-

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**TABLE 1.** (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
2. 64	ICHUM-1507	D. 9 - 3	sect.	-		-
2. 65	ICHUM-1508	D.12 / 2 / 3	sect.	-		-
2. 66	ICHUM-1509	D. 11 - 2 / 2	sect.	-		-
2. 67	ICHUM-1510	D. 11. 4	sect.	-		-
2. 68	ICHUM-1511	D. 6 - 4	sect.	-		-
2. 69	ICHUM-1512	D.12 / 3 / 2	sect.	-		-
2. 70	ICHUM-1513	7 - 7	sect.	-		-
2. 71	ICHUM-1514	D. 6 - 7	sect.	-		-
2. 72	ICHUM-1515	7 - 1	sect.	-		-
2. 74	ICHUM-1516	D.12 / 4 / D	sect.	-		-
2. 77	ICHUM-1517	1 - 4	sect.	-		-
2. 78	ICHUM-1518	am / 1 - 2	sect.	-		-
2. 80	ICHUM-1519	2 - 7	sect.	-		-
2. 82	ICHUM-1520	am 2 - 1	sect.	destroyed		-
2. 84	ICHUM-1521	2 - 4	sect.	-		-
2. 86	ICHUM-1522	am / 2 - 2	sect.	-		-
2. 87	ICHUM-1523	2 - 3	sect.	-		-
2. 89	ICHUM-1524	am / 2 - 5	sect.	-		-
2. 90	ICHUM-1525	2 - 6	sect.	-		-
2. 91	ICHUM-1526	2 - 8	sect.	-		-
2. 92	ICHUM-1527	a.m 7 - 5	sect.	-		-
2. 93	ICHUM-1528	1 - 3	sect.	-		-
2. 95	ICHUM-1529	D. 6 - 2	sect.	-		-
2. 96	ICHUM-1530	D. 6 - 1	sect.	-		-
2. 97	ICHUM-1531	ext	sect.	destroyed		-
2. 98	ICHUM-1532	13 / D - 5	sect.	-		-
2. 99	ICHUM-1533	D. 6 - 3 A	sect.	-		-
2. 100	ICHUM-1534	D. 6 - 3 B	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
3. 1	ICHUM-1535	D. 5 / 2	sect.	-		-
3. 2	ICHUM-1536	D 4 / 7	sect.	-		-
3. 3	ICHUM-1537	D. 5 / 1	sect.	-		-
3. 4	ICHUM-1538	D 4 / 6	sect.	-		-
3. 5	ICHUM-1539	D 4 / 8	sect.	-		-
3. 6	ICHUM-1540	D 4 / 5	sect.	-		-
3. 7	ICHUM-1541	D 4 / 4	sect.	-		-
3. 8	ICHUM-1542	D 4 / 3	sect.	-		-
3. 9	ICHUM-1543	D 4 / 2	sect.	-		-
3. 10	ICHUM-1544	10 **	sect.	-		-
3. 11	ICHUM-1545	D 3 / 35	sect.	-		-
3. 12	ICHUM-1546	D 3 / 34	sect.	-		-
3. 13	ICHUM-1547	D. 3 / 33	sect.	-		-
3. 14	ICHUM-1548	D 3 / 32	sect.	-		-
3. 15	ICHUM-1549	D 3 / 31	sect.	-		-
3. 16	ICHUM-1550	D. 3 / 30	sect.	-		-
3. 17	ICHUM-1551	D. 3 / 29	sect.	-		-
3. 18	ICHUM-1552	D. 3 / 28	sect.	-		-
3. 19	ICHUM-1553	D. 3 / 27	sect.	-		-
3. 20 *	ICHUM-1554	D. 14	WM	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 21	ICHUM-1555	D. 15	WM 1	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
"	ICHUM-1556	"	WM 2	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 22	ICHUM-1557	D. 16	WM	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 23	ICHUM-1558	D. 17	WM	unidentified		-

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**TABLE 1.** (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
3. 25	ICHUM-1559	D. 19	WM	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 26 *	ICHUM-1560	D. 21	WM	destroyed		-
3. 28 *	ICHUM-1561	D. 22	WM	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 29 *	ICHUM-1562	D. 23	WM 1	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
"	ICHUM-1563	"	WM 2	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 32 *	ICHUM-1564	D. 24	WM	<i>Cirrodrilus sapporensis</i> (Pierantoni, 1906)	non-type	Zariganimimizu
3. 34	ICHUM-1565	D. 1 - 1	sect.	-		-
3. 35	ICHUM-1566	D. 1 - 2	sect.	-		-
3. 36	ICHUM-1567	D. 1 - 4	sect.	-		-
3. 38	ICHUM-1568	D. 1 - 5	sect.	-		-
3. 39	ICHUM-1569	D. 1 - 6	sect.	-		-
3. 40	ICHUM-1570	D. 1 - 7	sect.	-		-
3. 41	ICHUM-1571	D. - 2 - 1	sect.	-		-
3. 42	ICHUM-1572	D. 2 - 2	sect.	-		-
3. 43	ICHUM-1573	D. 2 - 3	sect.	-		-
3. 44	ICHUM-1574	D. 2 - 4	sect.	-		-
3. 45	ICHUM-1575	D. 2 - 5	sect.	-		-
3. 46	ICHUM-1576	D. 2 - 6	sect.	-		-
3. 47	ICHUM-1577	D. 2 - 7	sect.	-		-
3. 48	ICHUM-1578	D. 3 - 1 / 1	sect.	-		-
3. 49	ICHUM-1579	D. 3 - 2 / 2	sect.	-		-
3. 50	ICHUM-1580	D. 3 - 3 / 3	sect.	-		-
3. 51	ICHUM-1581	D. 3 / 4 / 4	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
3. 52	ICHUM-1582	D. 3 / 5 / 5	sect.	-		-
3. 53	ICHUM-1583	D. 3 / 6 / 6	sect.	-		-
3. 54	ICHUM-1584	67	sect.	-		-
3. 55 *	ICHUM-1585	55	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1586	"	WM 2	unidentified		-
3. 56	ICHUM-1587	56	WM	unidentified		-
3. 57 *	ICHUM-1588	57	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1589	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
3. 58	ICHUM-1590	58	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1591	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
3. 59	ICHUM-1592	59	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1593	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
3. 60	ICHUM-1594	60	WM	unidentified		-
3. 61	ICHUM-1595	61	WM	unidentified		-
3. 62	ICHUM-1596	D. 3 / 26 / 26	sect.	-		-
3. 63	ICHUM-1597	D. 3 / 25 / 25	sect.	-		-
3. 64	ICHUM-1598	D. 3 / 24 / 24	sect.	-		-
3. 65	ICHUM-1599	D. 3 / 23 / 23	sect.	-		-
3. 66	ICHUM-1600	D. 3 / 22 / 22	sect.	-		-
3. 67	ICHUM-1601	D. 3 / 21 / 21	sect.	destroyed		-
3. 68	ICHUM-1602	D. 3 / 20 / 20	sect.	-		-
3. 69	ICHUM-1603	D. 3 / 19 / 19	sect.	-		-
3. 70	ICHUM-1604	D. 3 / 18 / 18	sect.	-		-
3. 71	ICHUM-1605	D. 3 / 17 / 17	sect.	-		-
3. 72	ICHUM-1606	D. 3 / 16 / 16	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
3. 73	ICHUM-1607	D. 3 / 15 / 15	sect.	-	-	-
3. 74	ICHUM-1608	D. 3 / 14 / 14	sect.	-	-	-
3. 75	ICHUM-1609	D. 3 / 13 / 13	sect.	-	-	-
3. 76	ICHUM-1610	D. 3 / 12 / 12	sect.	-	-	-
3. 77	ICHUM-1611	D. 3 / 11 / 11	sect.	-	-	-
3. 78	ICHUM-1612	D. 3 / 10 / 10	sect.	-	-	-
3. 79	ICHUM-1613	D. 3 / 9 / 9	sect.	-	-	-
3. 80	ICHUM-1614	D. 3 / 8 / 8	sect.	-	-	-
3. 81	ICHUM-1615	D. 3 / 7 / 7	sect.	-	-	-
3. 82 *	ICHUM-1616	F 6 **	WM	<i>Cirrodrilus suzukii</i> (Yamaguchi, 1934)	syntype	Suzuki-zariganimimizu
3. 83	ICHUM-1617	F 5 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932) ?	syntype ?	Uchida-zariganimimizu ?
3. 84	ICHUM-1618	F 4 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 85	ICHUM-1619	F 3 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 86 *	ICHUM-1620	F 2 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 87	ICHUM-1621	G. 4	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 88	ICHUM-1622	G. 5 **	WM	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
3. 89	ICHUM-1623	B. 11 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 90	ICHUM-1624	B. 6	WM 1	unidentified	-	-
"	ICHUM-1625	"	WM 2	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 91	ICHUM-1626	B. 5	WM 1	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
"	ICHUM-1627	"	WM 2	unidentified	-	-
"	ICHUM-1628	"	WM 3	unidentified	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
3. 92	ICHUM-1629	B. 10 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 93 *	ICHUM-1630	F 7 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 94 *	ICHUM-1631	G. 1 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 95	ICHUM-1632	G. 3 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 96	ICHUM-1633	D. 1 - 3	sect.	-		-
3. 97 *	ICHUM-1634	A' 35 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 98	ICHUM-1635	A' 34 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932) ?	syntype ?	Uchida-zariganimimizu ?
3. 99	ICHUM-1636	A 33 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932)?	syntype ?	Uchida-zariganimimizu
3. 100	ICHUM-1637	A 32 **	WM	<i>Cirrodrilus uchidai</i> (Yamaguchi, 1932) ?	syntype ?	Uchida-zariganimimizu ?
4. 2 *	ICHUM-1638	215 / 2	WM 1	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
"	ICHUM-1639	"	WM 2	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
4. 3	ICHUM-1640	215 / 3	WM	unidentified		-
4. 4	ICHUM-1641	215 / 4	WM	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
4. 5 *	ICHUM-1642	215 / 5	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
4. 6	ICHUM-1643	215 / 6	WM	unidentified		-
4. 7	ICHUM-1644	215 / 7	WM	unidentified		-
4. 8 *	ICHUM-1645	215 / 8	WM	<i>Branchiobdella monodontus</i> Liu & Zhang, 1983	non-type	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
4. 9 *	ICHUM-1646	215 / 9	WM	<i>Branchiobdella monodontus</i> Liu & Zhang, 1983	non-type	-
4. 12 *	ICHUM-1647	215 / 12	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
4. 13	ICHUM-1648	215 / 13	WM	unidentified		-
4. 14 *	ICHUM-1649	215 / 14	WM	<i>Holtodrilus truncatus</i> (Liang, 1963)	non-type	Ebi-yadorimimizu
4. 15 *	ICHUM-1650	215 / 15	WM	<i>Holtodrilus truncatus</i> (Liang, 1963)	non-type	Ebi-yadorimimizu
4. 16 *	ICHUM-1651	215 / 16	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
4. 18	ICHUM-1652	215 / 18	WM	<i>Holtodrilus truncatus</i> (Liang, 1963)	non-type	Ebi-yadorimimizu
4. 19	ICHUM-1653	230	WM	oligochaete		-
4. 21 *	ICHUM-1654	21	WM 1-7	unidentified		-
4. 31	ICHUM-1655	c.s. 25	WM 1	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1656	"	WM 2	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1657	"	WM 3	unidentified		-
4. 34	ICHUM-1658	34	WM	unidentified		-
4. 36	ICHUM-1659	c.s. - 25/ sp. c.s. /D 3	WM	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
4. 38	ICHUM-1660	c.s. - 23/ sp. c.s. /D. 5	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
"	ICHUM-1661	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
"	ICHUM-1662	"	WM 3	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
4. 40	ICHUM-1663	c. - 27	WM	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
4. 42	ICHUM-1664	c s. - 20/ sp. c.s /D 1	WM 1-3	unidentified		-
4. 43	ICHUM-1665	c.s - 21/ Sp. c.s /D 8	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
"	ICHUM-1666	"	WM 2	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1667	"	WM 3	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934) ?	syntype	Inukai-zariganimimizu ?
4. 45	ICHUM-1668	45	sect.	-		-
4. 46	ICHUM-1669	8	sect.	-		-
4. 48	ICHUM-1670	K. 3 2	WM	destroyed		-
4. 49	ICHUM-1671	12	WM	unidentified		-
4. 69	ICHUM-1672	69	WM	unidentified		-
4. 71	ICHUM-1673	71	WM	unidentified		-
4. 73	ICHUM-1674	73	sect.	-		-
4. 74	ICHUM-1675	10	sect.	-		-
4. 76	ICHUM-1676	76	sect.	destroyed		-
4. 77	ICHUM-1677	14	sect.	-		-
4. 78	ICHUM-1678	78	sect.	-		-
4. 82	ICHUM-1679	11	sect.	-		-
4. 86	ICHUM-1680	86	sect.	-		-
4. 92	ICHUM-1681	13	sect.	-		-
4. 97	ICHUM-1682	97	sect.	-		-
5. 1	ICHUM-1683	2 / Branch. Pentadonta	sect.	-		-
5. 2	ICHUM-1684	3 / Branch. Pentadonta	sect.	-		-
5. 3	ICHUM-1685	3 A / Branch. Pentadonta	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
5. 4	ICHUM-1686	K. 1 / 6	WM	<i>Branchiobdella macroperistomium</i> Liu & Zhang, 1983 ?	non-type	-
5. 8	ICHUM-1687	K. 1. 6 / K 1	sect.	-	-	-
5. 11	ICHUM-1688	K. 1. 8	sect.	-	-	-
5. 13	ICHUM-1689	K. 1. 9	sect.	-	-	-
5. 14	ICHUM-1690	K. 1. 10	sect.	-	-	-
5. 15 *	ICHUM-1691	K. 1 / 11	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
5. 16 *	ICHUM-1692	K. 1. 12	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
5. 18 *	ICHUM-1693	K. 1. 14 / K. 1 / D	WM	<i>Branchiobdella macroperistomium</i> Liu & Zhang, 1983 ?	non-type	-
5. 19	ICHUM-1694	K 1. / 15 / K 1. / D	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934	syntype ?	Kobayashi-hirumimizu
5. 20	ICHUM-1695	K. 1. / 13	WM	<i>Branchiobdella kobayashii</i> Yamaguchi, 1934 ?	syntype ?	Kobayashi-hirumimizu ?
5. 21	ICHUM-1696	K 1. 4 / K 1	sect.	-	-	-
5. 24	ICHUM-1697	K. 1 / 19	sect.	-	-	-
5. 28	ICHUM-1698	K. 2 - 4	sect.	-	-	-
5. 31	ICHUM-1699	K 2/ 2 /K. 2 - 5 - 2	sect.	-	-	-
5. 33	ICHUM-1700	K 2/ 1 /K. 2 - 5 - 1	sect.	-	-	-
5. 34	ICHUM-1701	K 2 / 17	sect.	-	-	-
5. 37	ICHUM-1702	K. 2	sect.	-	-	-
5. 40	ICHUM-1703	K 3 / 17 - 2	sect.	-	-	-
5. 42	ICHUM-1704	K 3 / 17 - 1	sect.	-	-	-
5. 44	ICHUM-1705	K. 3 / 8	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
5. 45	ICHUM-1706	K. 3 / 10 / K. 3 / D	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 46	ICHUM-1707	K 3 / 9 / K 3 / D	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 47 *	ICHUM-1708	K. 3 / 11 / K 3 / D	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 48 *	ICHUM-1709	K 3 / 2	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 49	ICHUM-1710	K. 3 / 12	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 50	ICHUM-1711	K. 3 / 13 / K 3 / D	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 51 *	ICHUM-1712	K. 3 / 14	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 52	ICHUM-1713	K. 3 / 15	WM	<i>Cirrodrilus kawamurai</i> (Yamaguchi, 1934)	syntype ?	Kawamura-zariganimimizu
5. 58	ICHUM-1714	K. 6	sect.	-	-	-
5. 59	ICHUM-1715	K. 5 - 4 - 2	sect.	-	-	-
5. 60	ICHUM-1716	K. 5 - 4 - 3 / K 5 / 1 - 3	sect.	-	-	-
5. 61	ICHUM-1717	K. 4 - 10 - 3	sect.	-	-	-
5. 62	ICHUM-1718	K. 4 - 6	sect.	-	-	-
5. 63	ICHUM-1719	K. 3 - 6 - 4 / K 3	sect.	-	-	-
5. 64	ICHUM-1720	K. 3 / 5	sect.	-	-	-
5. 65	ICHUM-1721	K. 4 - 5	sect.	-	-	-
5. 66	ICHUM-1722	K 4 / 4	WM	unidentified	-	-
5. 67	ICHUM-1723	K 4 / 8	WM	unidentified	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
5. 68	ICHUM-1724	K. 4 / 9	WM	<i>Branchiobdella orientalis</i> Yamaguchi, 1934	syntype ?	Oo-hirumimizu
5. 69	ICHUM-1725	K. 4 / 10	WM	<i>Branchiobdella orientalis</i> Yamaguchi, 1934	syntype ?	Oo-hirumimizu
5. 70	ICHUM-1726	K 3 / 16 -1	sect.	-	-	-
5. 72	ICHUM-1727	K. 2. - 3	sect.	-	-	-
5. 73	ICHUM-1728	1./ Branchio. Pentadonta	sect.	-	-	-
5. 75	ICHUM-1729	K. 4. 4 - 2	sect.	-	-	-
5. 76	ICHUM-1730	K 3 / K 3 - 6 - 3	sect.	-	-	-
5. 77	ICHUM-1731	K 3. 16 - 2	sect.	-	-	-
5. 78	ICHUM-1732	K. 4. 4 - 1 / 1 - 1	sect.	-	-	-
5. 79	ICHUM-1733	K. 4 / 2. - 3	sect.	-	-	-
5. 80	ICHUM-1734	K. 4 / 2. 2 - 3	sect.	-	-	-
5. 81	ICHUM-1735	K 5 / K. 5 / 5	sect.	-	-	-
5. 82	ICHUM-1736	K 3 / K. 3 - 6 - 1	sect.	-	-	-
5. 83	ICHUM-1737	K 3 / K 3. - 6 - 2	sect.	-	-	-
5. 85	ICHUM-1738	K. 4 -11- 1	sect.	-	-	-
5. 86	ICHUM-1739	K. 4 -11- 2	sect.	-	-	-
5. 87	ICHUM-1740	K. 5. 13 - 2	sect.	-	-	-
5. 88	ICHUM-1741	K 5 / 13 - 4	sect.	-	-	-
5. 89	ICHUM-1742	K. 5 - 13 - 1	sect.	-	-	-
5. 90	ICHUM-1743	K 4 / 2. 1 - 2	sect.	-	-	-
5. 91	ICHUM-1744	K 4 / 3. 1 - 1 / 2. 1	sect.	-	-	-
5. 93	ICHUM-1745	K 5. - 4 - 1	sect.	-	-	-
5. 94	ICHUM-1746	K. 4. - 11 - 3	sect.	-	-	-
5. 95	ICHUM-1747	K. 5 / 5	sect.	-	-	-
5. 96 *	ICHUM-1748	K 2 / 6	WM 1	<i>Cirrodrilus chosen</i> (Yamaguchi, 1934)	syntype	Chosen-zariganimimizu

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
"	ICHUM-1749	"	WM 2	<i>Cirrodrilus chosen</i> (Yamaguchi, 1934)	syntype	Chosen-zariganimimizu
"	ICHUM-1750	"	WM 3	<i>Cirrodrilus chosen</i> (Yamaguchi, 1934)	syntype	Chosen-zariganimimizu
5. 97	ICHUM-1751	K 5 / 7	WM	<i>Cirrodrilus suzukii</i> (Yamaguchi, 1934)	syntype ?	Suzuki-zariganimimizu
5. 98 *	ICHUM-1752	K. 5 / 8	WM	<i>Cirrodrilus chosen</i> (Yamaguchi, 1934)	syntype	Chosen-zariganimimizu
5. 99 *	ICHUM-1753	K 5 / 9	WM	<i>Cirrodrilus suzukii</i> (Yamaguchi, 1934)	syntype ?	Suzuki-zariganimimizu
5. 100	ICHUM-1754	K. 5 / 11	WM	<i>Cirrodrilus suzukii</i> (Yamaguchi, 1934)	syntype ?	Suzuki-zariganimimizu
6. 1	ICHUM-1755	am A / 2	sect.	-	-	-
6. 2	ICHUM-1756	am B / 4	sect.	-	-	-
6. 3	ICHUM-1757	am A / 1	sect.	-	-	-
6. 4	ICHUM-1758	am A / 5	sect.	-	-	-
6. 5	ICHUM-1759	am A / 6	sect.	-	-	-
6. 6	ICHUM-1760	am A / 4	sect.	-	-	-
6. 7	ICHUM-1761	am. B / 5	sect.	-	-	-
6. 8	ICHUM-1762	am A / 3	sect.	-	-	-
6. 9	ICHUM-1763	am B / 1	sect.	-	-	-
6. 10	ICHUM-1764	am. B / 2	sect.	-	-	-
6. 11	ICHUM-1765	am B / 3	sect.	-	-	-
6. 12	ICHUM-1766	am A / 7	sect.	-	-	-
6. 13	ICHUM-1767	am B / 6	sect.	-	-	-
6. 21	ICHUM-1768	AO / 1	WM	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
6. 24	ICHUM-1769	AO / 2	WM	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
6. 25	ICHUM-1770	AO / 3	WM	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
6. 26 *	ICHUM-1771	AO / 4	WM 1	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1772	"	WM 2	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
6. 27 *	ICHUM-1773	27	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1774	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1775	"	WM 3	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1776	"	WM 4	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1777	"	WM 5	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
"	ICHUM-1778	"	WM 6	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
6. 28	ICHUM-1779	AO / A 2	WM	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
6. 29	ICHUM-1780	AO / 5	WM	<i>Cirrodrilus aomorensis</i> (Yamaguchi, 1934)	syntype	Aomori-zariganimimizu
6. 31	ICHUM-1781	C - 8	WM 1	<i>Cirrodrilus suzukii</i> (Yamaguchi, 1934)	syntype ?	Suzuki-zariganimimizu
"	ICHUM-1782	"	WM 2	unidentified		-
"	ICHUM-1783	"	WM 3	unidentified		-
"	ICHUM-1784	"	WM 4	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
6. 32	ICHUM-1785	K 1. / 5 / 51 / K 1	sect.	-		-
6. 33	ICHUM-1786	c.d.s. 20 / c.d.s.	sect.	-		-
6. 34	ICHUM-1787	c.d.s / c.d s / 18	sect.	-		-
6. 35	ICHUM-1788	c d s. 19 / c.d.s 5	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
6. 37 *	ICHUM-1789	Sp.c d 1 / D 1 /c.d s 17	WM	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
6. 38	ICHUM-1790	c.d.s. 21	sect.	-	-	-
6. 39	ICHUM-1791	39	WM	unidentified	-	-
6. 40	ICHUM-1792	40	WM	unidentified	-	-
6. 41	ICHUM-1793	41	WM 1-2	unidentified	-	-
6. 42	ICHUM-1794	c.s - 22/ Sp. c.s. /D 2	WM 1	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1795	"	WM 2	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
"	ICHUM-1796	"	WM 3	<i>Cirrodrilus inukaii</i> (Yamaguchi, 1934)	syntype	Inukai-zariganimimizu
6. 43	ICHUM-1797	c. - 7	WM 1	unidentified	-	-
"	ICHUM-1798	"	WM 2	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1799	"	WM 3	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1800	"	WM 4	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1801	"	WM 5	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1802	"	WM 6	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1803	"	WM 7	unidentified	-	-
"	ICHUM-1804	"	WM 8	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1805	"	WM 9	unidentified	-	-
"	ICHUM-1806	"	WM 10	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
6. 44	ICHUM-1807	c - 9	WM 1	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1808	"	WM 2	unidentified	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
"	ICHUM-1809	"	WM 3	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1810	"	WM 4	unidentified		-
6. 46 *	ICHUM-1811	c.- 4/c.d.s /c.d.l./ Soranuma	WM 1	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1812	"	WM 2	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
6. 47	ICHUM-1813	c. - 6	WM 1	unidentified		-
"	ICHUM-1814	"	WM 2	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1815	"	WM 3	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1816	"	WM 4	unidentified		-
"	ICHUM-1817	"	WM 5	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1818	"	WM 6	unidentified		-
6. 48	ICHUM-1819	c. - 5	WM 1	unidentified		-
"	ICHUM-1820	"	WM 2	unidentified		-
"	ICHUM-1821	"	WM 3	<i>Cirrodrilus ezoensis</i> (Yamaguchi, 1934)	syntype	Ezo-zariganimimizu
"	ICHUM-1822	"	WM 4	unidentified		-
"	ICHUM-1823	"	WM 5	unidentified		-
"	ICHUM-1824	"	WM 6	unidentified		-
6. 50	ICHUM-1825	c. - 3 / Soranuma	WM 1	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
"	ICHUM-1826	"	WM 2	unidentified		-
"	ICHUM-1827	"	WM 3	unidentified		-
"	ICHUM-1828	"	WM 4	unidentified		-
6. 51	ICHUM-1829	c.m.b / 9	sect.	-		-
6. 52	ICHUM-1830	c.m.b. - 3 / A - 1 **	sect.	-		-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
6. 53	ICHUM-1831	c m b - 3 / A - 2 **	sect.	-	-	-
6. 54	ICHUM-1832	c m b - 4 / B - 1 **	sect.	-	-	-
6. 55	ICHUM-1833	c.m.b - 4 / B - 2 **	sect.	-	-	-
6. 56	ICHUM-1834	c m b. / 6 **	sect.	-	-	-
6. 57	ICHUM-1835	c m b / 7 / 7 **	sect.	-	-	-
6. 58 *	ICHUM-1836	c m b 2 **	-	original slide	-	-
6. 59	ICHUM-1837	Box 6, Slide 58 A / cmb 2	WM	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 60	ICHUM-1838	Box 6, Slide 58 B / cmb 2	WM	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 61	ICHUM-1839	Box 6, Slide 58 C / cmb 2	WM	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 62	ICHUM-1840	Box 6, Slide 58 D / cmb 2	WM	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 63	ICHUM-1841	c.m.b / 8 / 8	sect.	-	-	-
6. 64	ICHUM-1842	c.m.b. / 12 / c	WM	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 65	ICHUM-1843	c m b / 13	WM 1	unidentified	-	-
"	ICHUM-1844	"	WM 2	unidentified	-	-
"	ICHUM-1845	"	WM 3	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
"	ICHUM-1846	"	WM 4	<i>Cirrodrilus homodontus</i> (Yamaguchi, 1932)	syntype ?	Hoso-zariganimimizu
6. 67	ICHUM-1847	c m b. / 14	WM	unidentified	-	-
6. 68	ICHUM-1848	c m b / 15	WM	unidentified	-	-
6. 69	ICHUM-1849	c m b / 16 / c m b / 9 -	sect.	-	-	-
6. 74	ICHUM-1850	c m b / 17 / 4	sect.	-	-	-

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TABLE 1. (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
6. 80	ICHUM-1851	c m b /18 / c m b /3	sect.	-		-
6. 83	ICHUM-1852	13 - 1	sect.	-		-
6. 85	ICHUM-1853	13 - 2	sect.	-		-
6. 87	ICHUM-1854	c m b / 6 - 2	sect.	-		-
6. 88	ICHUM-1855	6 - 2	sect.	-		-
6. 89	ICHUM-1856	c m b / 13 - 3	sect.	-		-
6. 90	ICHUM-1857	90	sect.	-		-
6. 91	ICHUM-1858	91	sect.	-		-
6. 92	ICHUM-1859	c.d l. 10 - 3	sect.	-		-
6. 93	ICHUM-1860	c.d l. 10 - 2	sect.	-		-
6. 94	ICHUM-1861	c.d l. 10 - 1	sect.	-		-
6. 95	ICHUM-1862	c.d.l. 9 - 2	sect.	-		-
6. 96	ICHUM-1863	c.d l 9 - 1 / 1	sect.	-		-
6. 98	ICHUM-1864	c.d l. 8 /Sp. c.d.l. / D 2	WM	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
6. 99	ICHUM-1865	c.d.l./ 7 /Sp. c d l/D 3	WM	<i>Cirrodrilus megalodentatus</i> (Yamaguchi, 1934)	syntype	Ooago-zariganimimizu
-	-	100 / A3	sect.	-		-
-	-	101 / A4	sect.	-		-
-	-	103 / A6-1	sect.	-		-
-	-	106 / A A7	WM	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
-	-	108	WM	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
-	-	113 / A16	WM	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
-	-	114 / A' 37-1A' 37-2	sect.	-		-
-	-	119 / 32-2	sect.	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu

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**TABLE 1.** (Continued)

Box / Slide No.	Catalog No.	Slide Markings	Specimen(s) Status	Species Ident.	Type Status	Japanese common name
-	-	120	WM	<i>Cirrodrilus cirratus</i> Pierantoni, 1905	non-type	Kamuri-zariganimimizu
-	-	123	sect.	-	-	-
-	-	124 / Tot E	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype	Nippon-zariganimimizu
-	-	125 / E18	WM	<i>Cirrodrilus nipponicus</i> (Yamaguchi, 1932)	syntype	Nippon-zariganimimizu
-	-	131 / F10	sect.	-	-	-
-	-	133 / F12	sect.	-	-	-

Abbreviations according to column: \* in Box / Slide No. column, specimen was remounted.

Catalog No. ICHAM, Invertebrate Collection of the Hokkaido University Museum, Sapporo, Japan, previously the Zoological Institute, Hokkaido University (ZIHU); USNM, National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.

\*\* in Slide Markings column, Japanese characters present on slide; WM / sect., specimens whole mounted (WM) or sectioned (sect.); ?, tentative identification or "unidentified" species with specimens; -, no sections were identified.

### Slide collection organization and examination

As already noted, Prof. Yamaguchi's records and slide catalog have not been found to date, but there is no evidence to indicate they have been destroyed. Therefore it is vital that the slides be kept in the original order in their boxes so that details in the catalog, when found, can be unambiguously assigned to a slide. Therefore, each slide was given a reference number based on its slide box and slot number; as an example, the slide in box 2, slot 46, is referred to as 2.46 (Table 1). There is no information about the slides on the box lids, but many slides carry abbreviations in Roman letters and Arabic numbers (Table 1, Slide Markings), plus occasional names or characters; the latter being indicated by \*\* in Table 1. Although some of these letters have an obvious interpretation, e.g., "c.s." being cross section (corroborated by viewing the sections), other letters and numbers are meaningless without the catalog.

Prior to depositing the collection, Prof. Ohtaka arranged for slides to be assigned sequential catalog numbers from the museum in the Zoological Institute, Hokkaido University, Japan, using the prefix ZIHU. Subsequently, the museum had a name change and it is now called the Invertebrate Collection of the Hokkaido University Museum, Sapporo, Japan, and so holdings now have the prefix ICHUM although catalog numbers remain the same. It is important to clearly state this change as the slides referred to in Gelder & Ohtaka (2002) carry the old ZIHU prefix, while their ICHUM designation is used in this article.

As the morphological characters of the jaws and peristomial appendages in the serial, stained sections could not be easily recognized during the preliminary study, no attempt was made to identify the species. While the sections would not allow the jaws to be reconstructed, the arrangement of peristomial tentacles and other surficial features can be determined—including the taxonomically important positions of the anterior nephidial pores and the male reproductive organs. As these organs are important features in determining a species in many branchiobdellidans, identification of this material is probable. However, the male system has only been described in detail in recent new species from Japan, although Yamaguchi (1934: Fig. 4) did provide such information for *Cirrodrilus inukaii* and Gelder (1987) for *C. cirratus* and *C. uchidai*. Therefore, for the male reproductive system to be fully utilized in an identification, the morphology needs to be described in newly collected specimens of the remaining Japanese species.



The whole mounted specimens were examined with a Nikon research microscope using bright-field, dark-field, phase contrast, and differential interference contrast (DIC) illuminations. Slides with a broken cover-glass, or with air-bubbles touching a specimen were remounted and examined.

Whole-mounted specimens were identified and the name of the species was written on the slide label; if the identification was equivocal, a question mark was added. Some slides had multiple specimens on them and so each specimen was assigned a number, written on the coverglass in ink. As an example, slide 6.43 (ICHUM-1797) had seven specimens on it; these are designated WM 1 to WM 7 becoming (ICHUM-1797 to ICHUM-1806) with an identification given for each, which were indicated both on the slide label and in Table 1. Where the mounting medium was damaged the specimens were remounted and this is indicated by an asterisk (\*) in Table 1. In one case, the four specimens on slide 6.58 (ICHUM-1836) were remounted on new, separate slides and cataloged as 6.59 to 6.62 (ICHUM-1837 to ICHUM-1840), and the original slide (6.58) with its written characters was returned to its original slot. Six slides (box/slot nos. 2.82, 2.97, 3.26, 3.67, 4.48, 4.76) had either been broken into many pieces and/or the specimens had cracked into small pieces, and were beyond restoration. These destroyed slides were not returned to the original slide box slots, but they were assigned museum catalog numbers so their fate could be traced when the original laboratory records are found.

In 2018, ten slides with branchiobdellidans were found scattered among Prof. Yamaguchi's oligochaete collection in Hakodate University. The specimens were in poor condition, and have not been entered into the museum's register, but placed at the end of Table 1 for completeness.

## Results and Discussion

The rediscovered slide collection was found to contain specimens of all 17 species described by Prof. Yamaguchi, together with specimens of three other species described after his death. These latter species included *Holtodrilus truncatus* (Liang, 1963) (slides 4.14 and 4.15), *Branchiobdella macropersistomium* Liu & Zhang, 1983 (slides 5.4 and 5.18), and *Branchiobdella monodontus* Liu & Zhang, 1983 (slides 4.8 and 4.9). Yamaguchi (1934:177, 178) obtained specimens of the European *Branchiobdella pentadonta* Whitman, 1882, from Prof. W. Michaelsen of Hamburg, Germany, for comparison with his Oriental material. Whole mounts on slides 5.1 (ICHUM-1683), 5.2 (ICHUM-1684), 5.3 (ICHUM-1685), 5.73 (ICHUM-1728) carry the name *B. pentadonta* (Table 1). It is probable that some of the other specimens supplied by Michaelsen were sectioned by Yamaguchi and placed in the collection. Such material could be identified in the future as the male reproductive organs and number of paired testes in *Branchiobdella* differs from those in *Cirrodrilus*.

The type description of *Cirrodrilus cirratus* Pierantoni, 1905 was based on poorly preserved and deformed specimens; the type having its body rotated 180° in relation to its head, hence dorsal appendages were called "ventral cirri" (Pierantoni 1905: fig. 1). Yamaguchi (1932a) made a detailed redescription of *C. cirratus*, and as a result was able to recognize a different but very similar species, *Cirrodrilus uchidai* (Yamaguchi, 1932). Although he studied their reproductive systems, little information was included in his paper. Subsequent studies of *C. uchidai* specimens showed that some morphological characters—body length, peristomial tentacle length and the presence and number of dorsal segmental appendages—were quite variable (Yamaguchi 1934: 212, fig. 15 A, B, C, and D). Whether such variability is intraspecific or an indication of a species complex is unknown; however, the specimens examined by Yamaguchi—and recently by us as discussed in this paper—are cataloged in the ICHUM collection for future investigation.

Pierantoni (1906) described a second Japanese species, but because it lacked segmental "cirri" he placed it in a new genus, *Stephanodrilus*. He (Pierantoni 1912) then described another two species and placed them in the same genus. In subsequent works these species were assigned to various genera, but Yamaguchi (1934) reverted back to using *Stephanodrilus* (Gelder & Ohtaka 2002). Professor Yamaguchi gave a few of his specimens to Prof. P.C. Holt, and this allowed Holt (1967: 2–3), using the Principle of Priority as presented in Art. 23.1 of the International Code of Zoological Nomenclature (International Commission on Zoological Nomenclature 2000), to state that *Cirrodrilus* has historical priority and is therefore the correct name for the genus.

The jaws provide a major diagnostic character for *Cirrodrilus nipponicus* (Yamaguchi, 1932c). The ends of the ridge supporting the small teeth on the anterior-facing surface of the jaws curve inwards toward their respective bases. This curling of the lateral ends is not always easy to distinguish, but it is clearly shown in slides 1.4 (ICHUM-1399), 1.86 (ICHUM-1463), and 1.88 (ICHUM-1464).

Yamaguchi (1934: 198, 199) recognized that only three character states separate *Cirrodrilus ezoensis* (Yamaguchi, 1934) from *Cirrodrilus megalodontatus* (Yamaguchi, 1934), as the two species are identical in all other respects. These characters are: the position of the anterior nephridiopores on segment 3, and the difference in size and number of small teeth on the dorsal jaws. In the specimens available, the position of the anterior nephridiopores could not be determined. The number of small teeth on the dorsal jaw of *C. ezoensis* is eight and for *C. megalodontatus* is six (Yamaguchi 1934:197, 198); however, these numbers were observed to vary by plus or minus two. The difference in size of the dorsal jaw in the two species is significant, and this was verified by measuring the dimensions of the dorsal jaws from both species. The dorsal jaw in ten specimens of *C. ezoensis* was measured (width of jaw base, 15.0 to 15.2 mm; height of median tooth from base to apex, 15.8 to 20.5 mm) and compared to measurements made on 11 specimens of *C. megalodontatus* (width of jaw base, 25.3 to 30.0 mm; height of median tooth from base to apex, 26.8 to 31.6 mm). When the jaws are in a direct dorso-ventral orientation, the sides of the central, dorsal tooth appear straight in *C. ezoensis* but convex in *C. megalodontatus*. Although shown by Yamaguchi (1934:197, fig.7B, and 198, fig. 8B), this feature was not easy to recognize until the syntype specimens were found for reference (Table 1).

Two specimens of *Hidejiodrilus koreanus* (Pierantoni, 1912) were identified (slides 1.46 (ICHUM-1431) and 1.99 (ICHUM-1466) based on the characteristic appearance of the jaws, with all of them having a 3-1-3/3-1-3 dental formula. This is an important discovery as the type material no longer exists in the Hamburg Museum, Germany (Gelder 1987). Gelder & Brinkhurst (1990) recognized this species was not a member of the *Cirrodrilus* and transferred it to the new monotypic *Hidejiodrilus* based on the type description. As this did not include any details of the male reproductive system, the new genus could not be assigned to a family and was designated *incertae sedis* by Gelder (1996). After receiving specimens from Korea, Gelder (2010) redescribed the species, including the male reproductive system, which allowed the genus to be placed in the subfamily Bdellodrilinae. The examined specimens were then designated as a neotype and two neoparatypes.

Signal crayfish, *Pacifastacus leniusculus* (Dana, 1852), from Oregon, U.S.A., were introduced into Japan five times between 1926 to 1930 (Kamita 1970; Kawai 2017), and they carried branchiobdellidans which were named, *Cambarincola okadai* Yamaguchi, 1933. The type description only included body shape and jaw structure, and these were similar to the subsequently described *Triannulata montanus* Goodnight, 1940 from Washington State, USA. Holt (1974) recognized the latter species had been placed incorrectly in the *Triannulata*, and transferred it to *Cambarincola montanus* (Goodnight, 1940). By this time the Yamaguchi collection was presumed lost, and so Holt and Opell (1993: 253) considered *C. okadai* to be *nomen inquirendum*. During the examination of the rediscovered collection, four specimens of *C. okadai* were identified, including the individual drawn in Yamaguchi's (1933: fig. 1) type description. This resulted in a redescription of the species, the names *Triannulata montanus* and *Cambarincola montanus* reduced to junior synonyms, and the four specimens being designated as syntypes (Gelder & Ohtaka 2000b). Three of these specimens were deposited in the Invertebrate Collection of the Hokkaido University Museum, Sapporo (ICHAM)—slide 2.20 is designated the lectotype (ICHUM-1347) and slides 2.4 and 2.10 become paralectotypes (ICHUM-1348, ICHUM-1349). The fourth specimen—a third paralectotype, slide 2.9 (USNM 186575)—was placed in the National Museum of Natural History—Smithsonian Institution, Washington D.C., U.S.A.

Information from a series of taxonomical studies by Yamaguchi, plus the history of Prof. Yamaguchi's research (Mikami 1963) and an interview with Prof. Kamihira by Prof. Ohtaka, has enabled the status of some identified specimens to be determined. Yamaguchi's (1934) collection and descriptions of six species, *Cirrodrilus inukaii*, *C. aomorenensis*, *C. ezoensis*, *C. megalodontatus*, *C. makinoi* and *C. chosen*, are only found in that publication, hence these specimens were designated syntypes. In contrast, additional specimens were used to supplement the original descriptions for three Japanese species (*Cirrodrilus uchidai*, *C. homodontus* and *C. nipponicus*) and four mainland species (*Branchiobdella orientalis*, *B. kobayashii*, *C. kawamurai* and *C. suzukii*), therefore these slides in the collection probably contain both original (syntype) and additional (non-type) specimens; hence they are labeled as "syntype ?" in Table 1.

The Yamaguchi slide collection provides an invaluable resource for future research on East Asian branchiobdellidans, and this review of current information will greatly assist researchers, particularly those investigating the sectioned material in the collection.

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