

Cirrhilabrus naokoae, a new labrid fish from Indonesia

John E. Randall¹ and Hiroyuki Tanaka²

1) Bishop Museum, 1525 Bernice St., Honolulu, HI 96817-2704, USA. Email: jackr@hawaii.rr.com

2) 2-2-79 Jinguh, Miyazaki, Miyazaki 880, Japan. Email: cirrhilabrus@msn.com

Received: 23 August 2008 – Accepted: 01 October 2008

Abstract

The fairy wrasse *Cirrhalabrus naokoae* is described as a new species from three male specimens obtained via the aquarium trade; the probable locality is the vicinity of Medan on the northwest coast of Sumatra. It is related to *C. joanallenae*, *C. morrisoni*, and *C. rubriventralis*, which share the characters in the male of an elevated anterior part of the dorsal fin, very large pelvic fins, a single row of scales on the cheek, and some features of colour. It is most similar to *C. joanallenae*, differing in having the anterior lobe of the dorsal fin about one-fourth of the standard length (instead of a pennant from the first two dorsal spines as long or longer than the standard length in *C. joanallenae*), having 16 instead of 14 or 15 anterodorsal lateral-line scales, and having a broad bright yellow stripe on the side of the body.

Zusammenfassung

Auf der Grundlage von drei männlichen Exemplaren aus dem Aquarienhandel wird der Zwerglippfisch *Cirrhalabrus naokoae* als neue Art beschrieben; das wahrscheinliche Verbreitungsgebiet ist die Umgebung von Medan an der Nordwestküste von Sumatra. Die neu beschriebene Art ist nahe verwandt *C. joanallenae*, *C. morrisoni* und *C. rubriventralis*, mit denen sie folgende Merkmale gemeinsam hat: erhöhter vorderer Abschnitt der Rückenflosse, sehr große Bauchflossen und eine einzelne Schuppenreihe an der Wange sowie einige Farbkennzeichen. Am meisten ähnelt sie *C. joanallenae*; Unterscheidungsmerkmale sind aber die Größe des Vorderlappens der Rückenflosse von etwa einem Viertel der Standardlänge (während *C. joanallenae* ausgehend von den ersten beiden dorsalen Strahlen einen Wimpel aufweist, der genauso lang wie die Standardlänge oder länger ist), durch 16 statt 14 oder 15 anterodorsale Seitenlinienschuppen (im vorderen Rückenbereich) sowie einen breiten leuchtend gelben Streifen an der Körperseite.

Résumé

Cirrhalabrus naokoae est décrit comme espèce nouvelle sur base de trois spécimens mâles obtenus via le commerce aquariophile ; la localisation probable est au voisinage de Medan, sur la côte nord-ouest de Sumatra. Elle est proche de *C. joanallenae*, *C. morrisoni* et *C. rubriventralis*, et le mâle partage, avec ces espèces, les caractéristiques suivantes : une partie antérieure élevée de la dorsale, de très grandes pelviennes, une seule rangée d'écailles sur la joue et certains détails

de couleur. Elle est la plus proche de *C. joanallenae* ; les différences se marquent par le lobe antérieur de la dorsale d'environ un quart de la longueur standard (au lieu d'une excroissance des deux premiers rayons de la dorsale aussi longue ou plus longue que la longueur standard de *C. joanallenae*), par 16 (au lieu de 14 ou 15) écailles antérodorsales de la ligne latérale et par une large ligne jaune clair sur le côté du corps.

Sommario

Il tordo multicolore *Cirrhalabrus naokoae* è descritto come nuova specie sulla base di tre esemplari maschi ottenuti attraverso il commercio dei pesci d'acquario; la località più probabile è in prossimità di Medan sulla costa nordoccidentale di Sumatra è una specie vicina a *C. joanallenae*, *C. morrisoni* e *C. rubriventralis*, poiché tutti gli individui maschi condividono caratteristiche quali la parte anteriore della pinna dorsale elevata, pinne pelviche molto allargate, una singola file di scaglie sulla guancia e alcuni tratti della livrea. È più simile a *C. joanallenae*, da cui differisce per avere il lobo anteriore della dorsale circa un quarto della lunghezza standard (invece di un'estensione a bandierina tra le due spine dorsali lunga tanto quanto o più lunga della lunghezza standard in *C. joanallenae*), per avere 16 scaglie anterodorsali in linea laterale invece di 14 o 15 e, infine, per la presenza di un'ampia stria giallo brillante sul lato del corpo.

INTRODUCTION

The labrid fish genus *Cirrhalabrus* Temminck & Schlegel, 1845 was named without a type species. Bleeker (1851) described the first species of the genus as *C. cyanopleura* from Java, thus providing the type. Bleeker (1853a, b) added the second and third species as *C. solorensis* from Solor, Indonesia, and *C. temminckii* from Nagasaki, Japan. Fifty-one years elapsed before Snyder (1904) described *C. jordani* from the Hawaiian Islands (the status of *C. lyukyuensis* Ishigawa, 1904 as a species is questionable), and 70 more years before Smith (1957) named *C. exquisitus* from Mozambique. Springer & Randall (1974) added *C. blatteus* and *C. rubriventralis* from the Red Sea as the sixth and seventh species. From that date to the present, an

incredible 39 additional species have been described in the genus. Allen et al. (2008) added the 45th species as *C. beauperryi* from Papua New Guinea and the Solomon Islands. They provided a table with a list of the species of the genus and a summary statement of the distribution of each.

Several factors are responsible for this proliferation. All of the species are too small to be sought as food fishes. They feed on zooplankton in aggregations over coral reefs or adjacent rubble substrata, where they quickly take shelter as needed; consequently they are not often caught by trawls. Although a few species such as *Cirrhilabrus exquisitus* may be seen in relatively shallow water, most occur at depths greater than 20 m. *Cirrhilabrus bathyphilus* Randall & Nagareda, 2002 was collected from 60-217 m. Because of their relatively small size, ability to adapt to aquarium life, and the exceptional beauty of many of the species, in particular the males, they have value as aquarium fishes. Some of the species have first become known from the aquarium trade, especially in recent years as collectors seek the rare species that bring a high price. Such is the case for the present new species of the genus.

It is often difficult to obtain the correct locality and habitat for specimens purchased as aquarium fishes, especially those from Indonesia. The collectors may be reluctant to reveal the locality of capture, and their live fishes usually pass through one or more regional centers before reaching the major aquarium fish exporter. In the process, locality details may be lost. For the fish we describe here, we know only that the probable locality is the vicinity of Medan, Sumatra. We have obtained only three males.

MATERIALS AND METHODS

Type specimens of *Cirrhilabrus naokoae* n. sp. have been deposited in the Pusat Penelitian dan Pengembangan Oseanologie, Jakarta (NCIP); the Bernice P. Bishop Museum, Honolulu (BPBM); and the National Museum of Nature and Science, Tokyo (NSMT).

Lengths given for specimens are standard length (SL), the straight-line distance from the median anterior point of the upper lip to the base of the caudal fin (posterior end of hypural plate). Head length is measured from the same anterior point to the posterior end of the opercular membrane, and snout length from the same point to the fleshy edge of the orbit. Body depth is the greatest depth to the base of the dorsal spines; body width is the greatest width measured just posterior to the gill

opening. Orbit diameter is the greatest fleshy diameter, and interorbital width the least bony width. Caudal-peduncle depth is the least depth; caudal-peduncle length is measured horizontally from the rear base of the anal fin to the caudal-fin base. Predorsal, preanal, and prepelvic lengths are from the front of the upper lip to the origin of the respective fins. Lengths of fin spines and soft rays are measured from the tips to the extreme base of these elements. Pectoral-ray counts include the very short unbranched upper ray. Lateral-line scale counts are given in two parts, the dorsoanterior series from the upper end of the gill opening to below the soft portion of the dorsal fin, and the midlateral peduncular part to the base of the caudal fin (a single large pored scale posterior to the caudal-fin base is not counted). Gill-raker counts were made on the first gill arch (only the total count is given, as it is difficult to determine which raker is at the angle).

Table I gives the proportional measurements of the new species as percentages of the standard length. Proportional measurements in the text are rounded to the nearest 0.05. Data in parentheses in the description refer to the paratypes, unless otherwise stated.

Cirrhilabrus naokoae n. sp.

Naoko's Fairy Wrasse
(Figs 1-3 & 7, Table I)

?*Cirrhilabrus joanallena* Kuitert, 2002: 37, lower right figure (Java?).

Holotype: NCIP 6347, male, 60 mm, probable locality, vicinity of Medan, Sumatra, 10-20 m depth (from the aquarium trade).

Paratypes: BPBM 40919, male, 50 mm, and NSMT-P 91347, male, 55.5 mm, both with same data as holotype.

Diagnosis: Dorsal rays XI,9; anal rays III,9; pectoral rays 15; lateral-line scales 16 + 6 or 7; median predorsal scales 5; a single curving row of scales on cheek; gill rakers 14-16; dorsal fin elevated anteriorly, the fin height 25.5-27.5% SL; first dorsal spine longest, 16.0-16.3% SL (36-41% of fin height is membrane supported by a slender rod originating from behind tip of anterior spines); longest dorsal soft ray 15.8-16.1% SL; caudal fin slightly rounded to slightly double emarginate; pelvic fins very broad and long, extending beyond spinous portion of anal fin; color of male in preservative blackish dorsally

and ventrally, with a broad pale lateral stripe that includes all of snout, eye, base of pectoral fin, and ends at lower caudal-fin base; fins except pectorals black; color of males in life red dorsally, bluish white ventrally, with a broad yellow stripe between from pectoral-fin base to lower half of caudal peduncle; fins except pectorals mainly black. No female specimens were available.

Description: Dorsal rays XI,9; anal rays III,9; all dorsal and anal soft rays branched, the last to base; pectoral rays 15, the upper two unbranched; pelvic rays I,5; principal caudal rays 13, the upper and lower unbranched; upper and lower procurvent caudal rays 6, the most posterior segmented; lateral line interrupted, the dorsoanterior series 16 and midlateral peduncular series 7 (6), not including pored scale on caudal-fin base; scales above lateral line to origin of dorsal fin 2; scales below lateral line to origin of anal fin 6; median predorsal scales 5; median preanal scales 6; circumpeduncular scales 16; a single curving row of scales on cheek; gill rakers 15 (14-16); pseudobranchial filaments 10 (one count, holotype); branchiostegal rays 5; vertebrae 25.

Body depth 4.1 (3.35-4.05, the smallest paratype a fully ripe male with distended abdomen); body compressed, the width 2.2 (2.15-2.25) in depth; head length 2.95 (2.9-2.95) in SL; snout pointed, 3.3 (3.2-3.4) in head length; orbit diameter 4.3 (4.2-4.3) in head length; interorbital space flat, the bony width 4.25 (4.2-4.3) in head length; caudal-peduncle depth 2.65 (2.6-2.65) in head length; caudal-peduncle length 1.85 (1.9-2.0) in head length.

Mouth slightly inferior and oblique, forming an angle of about 20° to horizontal axis of body; upper-jaw length 4.05 (4.15) in head length; front of upper jaw with three pairs of canine teeth, a short medial forward-projecting pair, a middle pair twice as large and strongly curving laterally, and a very large third pair, strongly curving posteriorly; an inner row of very small, slender, conical teeth at front of jaw, continuing along side of jaw, with 22 teeth posterior to third canine in holotype; front of lower jaw with one pair of canine teeth, larger than medial upper pair, projecting both anteriorly and laterally, and fitting between upper two anterior pairs of canines when mouth closed; a small conical tooth directly posterior to each lower canine, and an inner row of very small, slender, conical teeth, 20 posterior to anterior canine; no teeth on palate; tongue slender and pointed, set far back in mouth; gill rakers short, the longest about one-sixth maximum length of gill filaments on first gill arch.

Table I. Proportional measurements of type specimens of *Cirrhitilabrus naokoae* as percentages of the standard length.

| | Holotype | Paratypes | |
|------------------------|--------------|---------------|-----------------|
| | NCIP 6347 | BPBM 40919 | NSMT-P 91347 |
| Sex | male | male | male |
| Standard length (mm) | 60 | 50 | 55.5 |
| Body depth | 24.5 | 29.8 | 24.6 |
| Body width | 11.2 | 13.9 | 10.9 |
| Head length | 35.2 | 35.9 | 35.2 |
| Snout length | 10.6 | 11.1 | 10.4 |
| Orbit diameter | 8.2 | 8.9 | 8.8 |
| Interorbital width | 8.3 | 8.4 | 8.4 |
| Upper jaw length | 8.7 | 8.6 | 8.5 |
| Caudal-peduncle depth | 13.3 | 13.9 | 13.2 |
| Caudal-peduncle length | 19.0 | 18.1 | 18.3 |
| Predorsal length | 32.7 | 33.8 | 32.8 |
| Preanal length | 59.4 | 58.9 | 58.7 |
| Prepelvic length | 34.5 | 34.8 | 32.3 |
| Dorsal-fin base | 57.8 | 56.4 | 56.9 |
| Height of dorsal fin | 26.7 | 25.5 | broken |
| First dorsal spine | 16.2 | 16.3 | 16.0 |
| Eleventh dorsal spine | 13.6 | 12.8 | 13.3 |
| Longest dorsal ray | 15.8 | 16.0 | 16.1 |
| Anal-fin base | 22.0 | 21.8 | 22.3 |
| First anal spine | 8.3 | 8.1 | 7.9 |
| Second anal spine | 11.2 | 10.0 | 10.4 |
| Third anal spine | 11.6 | 10.8 | 10.9 |
| Longest anal ray | 13.4 | 13.7 | 14.5 |
| Caudal-fin length | 23.5 | 24.4 | 23.7 |
| Pectoral-fin length | 20.4 | 20.6 | 21.2 |
| Pelvic spine length | 13.5 | 13.9 | 14.5 |
| Pelvic fin length | 42.7 | 41.3 | 37.8 |

Posterior margin of preopercle free to level of dorsal third of orbit, and ventral margin free to below anterior fourth of orbit; broad middle part of posterior margin of preopercle finely serrate (38 serrae on holotype).

Nostrils small, the anterior on a vertical nearly one-third distance from edge of orbit to front of snout, covered by a triangular flap on posterior edge; posterior nostril larger, with a slight fleshy rim, dorsoposterior to anterior nostril, the internarial distance one-fourth orbit diameter; 16 pores of cephalic lateralis system at edge of orbit from above middle of eye to below anterior margin of orbit; eight preopercular pores behind row of cheek scales, continuing as four more pores on mandible, the fourth pore median on chin.

Scales cycloid and flexible; postorbital head

scaled, the scales continuing anteriorly along ventral edge of opercle and on preopercle to below anterior edge of orbit; a series of nine scales curving in one row from behind dorsal edge of orbit to below anterior edge of orbit; median predorsal scales extending forward to above upper free end of preopercle; a row of large, oblique, pointed scales along base of dorsal fin and a similar row of smaller scales along base of anal fin; last scale of lateral line

on base of caudal fin, followed by a large pointed scale reaching more than half distance to posterior margin of fin, with a scale of nearly equal size above and below; a midlateral scaly process of two scales extending from between bases of pelvic fins to three-fifths length of pelvic spine; a slender pelvic axillary scale extending three-fourths length of pelvic spine.

Origin of dorsal fin above base of third lateral-line



Fig. 1. Holotype of *Cirrhilabrus naokoae*, male, BPBM 40918, 60 mm SL. Aquarium photo by H. Tanaka.



Fig. 2. Paratype of *Cirrhilabrus naokoae*, male, NSMT-P 91347, 55.5 mm SL. Aquarium photo by H. Tanaka.

scale, the predorsal length 3.05 (2.95-3.05) in SL; dorsal fin elevated anteriorly, the fin height 3.65 (3.9) in SL (36-41% of fin height is membrane supported by a slender rod originating from behind tip of anterior spines); first dorsal spine longest, 2.2 (2.2) in head length; last dorsal spine 2.6 (2.65-2.8) in head length; longest dorsal soft ray 2.2 (2.2-2.25) in head length; origin of anal fin below base of last two dorsal spines, the preanal length 4.55 (4.5-4.6) in SL; first anal spine 4.4 (4.45) in head length; second anal spine 3.15 (3.25-3.3) in head length; third anal spine 3.05 (3.2-3.3) in head length; membrane of anal fin elevated above anal spine tips by a slender supporting rod behind each spine tip; longest anal soft ray 2.6 (2.4-2.6) in head length; caudal fin slightly rounded to slightly double emarginate, 4.25 (4.2-4.3) in SL; pectoral fins pointed, the third ray longest (but second and fourth nearly as long), 1.7 (1.65-1.75) in head length; origin of pelvic fins below midbase of pectoral fins, the prepelvic length 2.9 (2.9-3.1) in SL; pelvic fins very broad and long, reaching posterior to spinous portion of anal fin, 2.35 (2.4-2.65) in SL.

Colour of holotype in alcohol: blackish dorsally and ventrally, with a broad pale lateral stripe that includes all of snout, eye, and base of pectoral fin, ending at lower caudal-fin base; fins except pectorals black.

Colour of holotype in life (Fig.1): dorsal part of head, including lips and eye, to above opercular flap bright red, abruptly bluish white

below, the demarcation irregular; easily overlooked are two, fine, broken blue lines dorsally on each side of head from snout to nape, one passing through upper part of eye and the other dorsal and parallel to it; body bright red dorsally to a demarcation from above pectoral-fin base to midbase of caudal fin, except for some dusky patches below elevated spinous portion of dorsal fin, and dark pigment along anterior part of lateral line; a broad bright yellow stripe on side of body below red dorsal zone, ending at ventral half of caudal-fin base; base of pectoral fin red within yellow stripe; body ventral to yellow stripe pale blue, extending anteriorly onto chest; elevated anterior part of dorsal fin black, remainder of fin black, grading to dark red distally, with a blue margin and black submarginal line, except outer half of four posterior membranes clear with a blue spot at edge of black ventral portion; base of each dorsal spine and ray with a vertically elongate red blotch; a small, round, bright blue spot at base of each membrane between each pair of red blotches; anal fin colored like middle soft portion of dorsal fin, except bluish white at base, and without red basal blotches; caudal fin mostly black, the membranes in outer part of fin variably light blue; series of red dots along upper and lower caudal rays; pectoral fins transparent; pelvic fins black; pelvic axillary scale pale blue.

Figure 2 is the 55.5-mm paratype showing the light blue color of the membranes of the caudal fin, a variable feature in the same individual. The red of



Fig. 3. Fright colour pattern of holotype of *Cirrhilabrus naokoae*. Aquarium photo by H. Tanaka.

the pectoral-fin base of this fish is continuous with the red dorsal area of the body. In the holotype, the pectoral-base colour is separated by yellow from the dorsal red body coloration.

Figure 3 of the holotype shows the fright colour pattern of this species.

Remarks: We have made every effort to positively determine the locality from which the type specimens of this species were collected in Indonesia.

We can only conclude that the most likely locality is the vicinity of Medan (03°35'N 98°39'E) on the Strait of Malacca coast of Sumatra. This fish is said to occur within a depth of about 10 to 20 m.

Our first specimen came on 1 February 2008 to an aquarium shop owner in Miyazaki City, Japan, who informed the second author that he had received a male of *Cirrhilabrus joanallena*. Although resembling that species in the colour of the fins and in



Fig. 4. *Cirrhilabrus rubriventralis*, male, 52 mm, Gulf of Aqaba, Red Sea, 11,5 m. Photo by J. E. Randall.



Fig. 5. *Cirrhilabrus morrisoni*, male, 65 mm, Hibernia Reef, Timor Sea, 30 m. Photo by G. R. Allen.

having very large pelvic fins, it differed from *C. joanallena* in having a broad yellow stripe on the side, and it lacked the very long dorsal pennant from the first two dorsal spines of this species. A second male was obtained from a pet store in Saitama Prefecture just north of Tokyo two days later.

The two fish were released together to a larger display tank, 40 x 40 x 120 cm. After initially hiding in rocks, they emerged and swam actively in the tank, soon accepting dried brine shrimp and flake food. They did not act aggressively to one another or other species in the tank. When approached by a larger fish, the fins were usually spread. On rare occasions when threatened, the abdomen became blackish. The colour of the caudal fin was observed to vary from entirely black to black with bright blue on the membranes to a variable extent, but mainly distally. Once the larger fish was observed to clean the body of a pyramid butterflyfish (*Hemitaurichthys polylepis*) for about 10 seconds (Fig. 7); twice during this period it appeared to remove something from the host fish. The two males found narrow spaces between the corals and rocks of the aquarium to sleep at night, sometimes together in the same crevice. A cocoon-like mass of mucus was sometimes noticed as the fish emerged from their nocturnal shelter.

The third male specimen was obtained by Siu Man Wong in Hong Kong, who preserved it in formalin and shipped it on to us. He also was not able

to obtain conclusive information on the locality of capture.

Kuiter (2002: 37, lower right figure) illustrated an individual of this species as ?*C. joanallena* from an aquarium photo taken by Scott Michael. The locality was given as (Java?).

Cirrhilabrus joanallena Allen, 2000 (Fig. 6) is clearly the closest relative to the new species. Its type locality is Weh Island off the northwestern tip of Sumatra, hence only about 450 km from the presumed type locality of *C. naokoae*.

The long dorsal pennant of the male of *C. joanallena* (about twice the height of the anterior part of the dorsal fin of *C. naokoae*) is the most obvious morphological difference of the two species. Allen (2000) gave this measurement in his Table II as the length of the first dorsal spine, but he meant the combined dorsal spine and pennant length. The two species also differ in the number of dorsoanterior lateral-line scales (14 or 15 for *C. joanallena*, 16 for *C. naokoae*), head length (33.3-34.8% SL for *C. joanallena*, 35.2-35.9% SL for *C. naokoae*), and the length of anal spines (about 1.4 times longer in *C. naokoae*).

The female phase of *Cirrhilabrus joanallena* (Allen, 2000: fig. 2) is very distinctly colored red, abruptly pale blue ventrally, with four longitudinal pale blue lines within the red part of the head and body, the two lower lines on the body dotted. We expect the female phase of *C. naokoae* to be similar in colour.



Fig. 6. *Cirrhilabrus joanallena*, male, about 45 mm, Weh Island, Aceh Province, Sumatra. Photo by G. R. Allen.

Cirrhilabrus rubriventralis Springer & Randall, 1974 from the Red Sea (Fig. 4) and Sri Lanka and *C. morrisoni* Allen, 1999 from the Timor Sea (Fig. 5) are other related species, judging from colour, elevated anterior part of dorsal fin, long pelvic fins, and the single row of scales on the cheek.

Etymology: We are pleased to name this colorful fish *Cirrhilabrus naokoae* in honor of the second author's wife Naoko.

ACKNOWLEDGEMENTS

We are very grateful to Siu Man Wong for providing one of our three type specimens of this new species and for his effort to determine its locality of origin. We also thank Pavaphon Supanantanont for his role as an intermediary in the shipment, and Loreen R. O'Hara of the Bishop Museum for x-rays. Gerald R. Allen, Helen A. Randall and Martin Gomon reviewed the manuscript.

REFERENCES

- ALLEN, G. R. 1999. Descriptions of a new wrasse (Pisces: Labridae; *Cirrhilabrus*) from north-western Australia. *Revue française d'Aquariologie* 25 (3-4) (1998): 119-122.
- ALLEN, G. R. 2000. Description of a new wrasse (Pisces: Labridae; *Cirrhilabrus*) from northern Sumatra, Indonesia. *aqua, Journal of Ichthyology and Aquatic Biology* 4 (2): 45-50.
- ALLEN, G. R., DREW, J. & BARBER, P. 2008. *Cirrhilabrus beauperryi*, a new wrasse (Pisces: Labridae) from Melanesia. *aqua, International Journal of Ichthyology*. 14 (3): 129-140.
- BLEEKER, P. 1851. *Cheilinoïdes*, een nieuw geslacht van gladschubbige Labroïden van Batavia. *Natuurkundig Tijdschrift voor Nederlandsch Indië* 2: 71-72.
- BLEEKER, P. 1853a. Bijdrage tot de kennis der ichthyologische fauna van Solor. *Natuurkundig Tijdschrift voor Nederlandsch Indië* 5: 67-96.
- BLEEKER, P. 1853b. Naleqingen op de ichthyologie van Japan. *Verhandelingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen* 25: 1-56.
- KUITER, R. H. 2002. *Fairy and Rainbow Wrasces and their Relatives*. TMC Publishing, Chorleywood, UK. 208 pp.
- RANDALL, J. E. & NAGAREDA, B. H. 2002. *Cirrhilabrus bathyphilus*, a new deep-dwelling labrid fish from the Coral Sea. *Cybium* 26 (2): 123-127.
- SMITH, J. L. B. 1957. List of the fishes of the family Labridae in the western Indian Ocean with new records and five new species. *Ichthyological Bulletin of the J. L. B. Smith Institute of Ichthyology* 7: 99-111.
- SPRINGER, V. G. & RANDALL, J. E. 1974. Two new species of the labrid fish genus *Cirrhilabrus* from the Red Sea. *Israel Journal of Zoology* 23 (1): 45-54.
- TEMMINCK, C. J. & SCHLEGEL, H. 1843-1850. Pisces. Pp. 1-345 in: *Fauna Japonica, sive descriptio animalium quae in itinere per Japoniam suscepto annis 1823-30 collegit, notis observationibus et adumbrationibus illustravit P. F. de Siebold*. A. Arnz & Co., Leiden.



Fig. 7. *Cirrhilabrus naokoae* cleaning the butterflyfish *Hemitaurichthys polylepis*. Aquarium photo by H. Tanaka.