RANGE EXTENSION FOR *OCULOPHRYXUS BICAULIS* SHIELDS & GÓMEZ, 1996 (ISOPODA, DAJIDAE) IN THE SOUTH CHINA SEA

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ABSTRACT

We report a significant range extension of the parasitic isopod *Oculophryxus bicaulis* Shields & Gómez, 1996 (Epicaridea, Dajidae) in the South China Sea (13°26′N 112°38′E). The parasite was found on *Stylocheiron affine* Hansen, 1910 (Western Equatorial form) and *S. longicorne* G. O. Sars, 1883 (short form). This species was previously found along the west coast of Baja California, México (20-29°N 112-118°W) on the euphausiid *S. affine* (California Current and Eastern Equatorial forms) and in the Gulf of Mexico (25°33′55″N 88°27′5″W) attached to *S. longicorne* (long form). Given that the host species are broadly distributed in the Pacific and Indian Oceans (*S. affine*) and elsewhere (cosmopolitan for *S. longicorne*), we suggest *O. bicaulis* has a broad, circumtropical range. This isopod has been found attached to three of the five ecophenotypic forms of *S. affine* and two of the three forms of *S. longicorne*. We propose that the ratio of the widths of the lower and upper portion of the eyes of the host (a character used to differentiate morphs) is a factor in the successful transmission or attachment of the parasite.

RESUMEN

Se presenta una significativa extensión de distribución del isópodo parásito *Oculophryxus bicaulis* Shields & Gómez, 1996 (Epicaridea: Dajidae) en el mar del sur de China (13°26′N 112°38′E). El parásito fue encontrado infectando al eufáusiaceo *Stylocheiron affine* Hansen, 1910 (ecofenotipo Ecuatorial Oeste) y a *S. longicorne* G. O. Sars, 1883 (ecofenotipo corto). Este isópodo se adhiere a los pedúnculos oculares de su huésped succionando sus fluidos corporales. *Oculophryxus bicaulis* ha sido previamente encontrado a lo largo de la costa occidental de Baja California, México (20 a 29°N 112 a 118°W) parasitando al eufáusiaceo *S. affine* (ecofenotipos de la Corriente de California y Ecuatorial Este) y en el Golfo de México (25°33′55″N 88°27′5″O) adherido a *S. longicorne* (ecofenotipo largo). Debido a que las especies hospederas son ampliamente distribuidas en los Oceanos Pacífico e Indico (*S. affine*) así como en todo el mundo (*S. longicorne* es cosmopolita), se propone que *O. bicaulis* tiene una amplia distribución circumtropical. Actualmente, este isópodo ha sido encontrado parasitando a tres de los cinco ecofenotipos de *S. affine* y dos de las tres formas de *S. longicorne*. Se propone que el radio del ancho de la parte superior e inferior de los ojos del hospedero (un carácter usado para diferenciar los diferentes ecofenotipos) es un factor importante en el éxito de transmisión o adhesión del parásito a su hospedero.

Epicaridean isopods are highly specialized parasites that infect other crustaceans. There are currently four different families of Epicaridea: the Bopyridae, Entoniscidae, Cryptoniscidae, and Dajidae. Like many epicarideans, dajids live externally on the carapaces or other surfaces of their hosts. While dajid isopods may be common in their host populations, they have received little attention, perhaps because they are difficult to identify, they are cryptic in certain host populations, and there is a general lack of expertise in identifying them. There are currently 18 genera of dajid isopods with 49 species.

We report a significant range extension for the most recently described species, *Oculophryxus bicaulis* Shields & Gómez, 1996. Type specimens of *Oculophryxus bicaulis* (USNM #274134, 274135) were collected along the west coast of Baja California, Mexico (20 to 29°N 112 to 118°W) on the euphausiid *Stylocheiron affine* Hansen, 1910, with an additional female specimen attached to *S. longicorne* Hansen, 1883 from the Gulf of Mexico (25°33′55″N 88°27′5″W) (USNM #135313). The initial findings indicated that *O. bicaulis* had a large range that included the eastern Pacific, and the Caribbean Sea. Given that the host species are broadly distributed in the Pacific and Indian Oceans (*S. affine*) and elsewhere (cosmopolitan for *S. longicorne*) (Brinton, 1962, 1975), we may expect that the distribution of the parasite extends as far as the range of its hosts, or that allopatric speciation events would lead to other species of the isopod on the same host species from widely separated locations.

Additional specimens of hosts and parasites were collected and sorted by Dr. Edward Brinton obtained from the Planktonic Invertebrates Collection of the Scripps Institution of Oceanography. The specimens were collected by the NAGA expedition, carried out jointly by Thailand, South Viet Nam and U.S.A. during 1959-1961 (Brinton, 1975). One female isopod was found attached to an immature *S. affine* (Western Equatorial form), and another female was found on an immature female of *S. longicorne* (short form). Both euphausiids were collected from NAGA cruise S8, Station 10 (13°26′ N 112°38′ E) from the South China Sea on 16 September 1960. The dajid isopods were identified by J.G.G. as specimens of *O. bicaulis*. Female *O. bicaulis* have a peculiar attachment to their host that distinguishes them from all of the other dajids; they wrap their elongate antennae around the eyestalks of their host. No significant differences were found in the length, breadth, or morphological features between individuals of *O. bicaulis* from the eastern Pacific, and the present specimens. While female isopods have several distinguishing characters, male isopods have only a few defining features (Shields & Gómez, 1996). Unfortunately, no male specimens were observed on the euphausiids from the South China Sea.

TABLE I

Morphometric measurements (mm) of ecophenotypes of *Stylocheiron affine* Hansen, 1910 and *S. longicorne* G. O. Sars, 1883 defined according to Brinton (1962, 1975). [a] Specimens from the NAGA Expedition, Plankton Invertebrate Collection, Scripps Institution of Oceanography; and [b] specimens from the eastern Pacific (Shields & Gómez, 1996). Length of adults is measured from tip of rostrum to tip of telson. Width of the widest part of Lower Eye = WLE, and Width of the Upper part of Eye at distal limit of last complete row of enlarged cones = WUE

Host species	Length of adults mm	Length of eye mm	WLE/WUE	Infected by *O. bicaulis*
Stylocheiron affine				
West Equatorial	5.40-8.50	0.75-0.97	1.67-2.16	yes ($N = 1$) [a]
California Current	5.80-8.30	0.67-0.89	1.72-1.96	yes ($N = 27$) [b]
East Equatorial	5.70-8.40	0.61-0.98	2.02-2.43	yes ($N = 1$) [b]
Indo-Australian	5.50-7.30	0.62-0.87	2.26-2.55	?
Central	6.00-8.00	1.00-1.25	1.45-1.74	no
Stylocheiron longicorne				
short form	6.20-10.30	0.81-1.25	1.00-1.44	yes ($N = 1$) [a]
long form	7.10-11.30	0.90-1.46	0.86-1.37	yes ($N = 1$) [b]
Indian Ocean form	7.00-12.00	1.00-1.40	1.24-1.42	?

Previously *O. bicaulis* was reported only from the California Current and the Eastern Equatorial ecophenotypes of *S. affine* and the long form of *S. longicorne* (Shields & Gómez, 1996) (the latter specimen was identified by its short rostrum and long sixth abdominal segment). At that time, the ratio of the widths of the lower and upper portion of the eyes of the host (a character used to differentiate morphs) was suggested as a factor in the successful transmission or attachment of the parasite (table I). The present data show that other host morphs are capable of being infected by the parasite, morphs that extend the range of the eye ratio. We speculate, however, that the morphology of the eye, the eye peduncle, and the rostrum may be still be important factors in the transmission of the parasite and may account for at least part of the host specificity of *O. bicaulis* on species of *Stylocheiron*. In effect, the Indo-Australian form of *S. affine* and all species of *S. longicorne* are susceptible to infection, but the Central Pacific form of *S. affine* has a much longer eye and a smaller WLE/WUE ratio than the other ecophenotypes. This form is frequently found in offshore stations along the west coast of Baja California. However these specimens have not been infected by *O. bicaulis*. Species of *S. longicorne* have similar morphometrics of the eye as the Central Pacific ecophenotype of *S. affine*, yet they are infected by the parasite (table I).

Our findings show that *O. bicaulis* has a broad, circumtropical range. Little is known of the life histories and geographic distributions of most of the dajid isopods. While it may be too early for zoogeographic studies like those for bopyrid isopods (Markham, 1986, 1992), we suggest that dajid isopods may provide a wealth of information on the population biologies, and stock assessment possibilities of their planktonic crustacean hosts.

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