

FIRST REPORT OF *DODECACERIA* SP. (POLYCHAETA: CIRRATULIDAE), IN RED ABALONE IN CHILE

N. ROZBACZYLO,^{1*} F. AVILÉS,² M. HERVE² AND M. GODOY²

¹Departamento de Ecología, Fac. Cs. Biológicas, Pontificia Universidad Católica de Chile, Santiago Chile; ²Aquagestión, Santiago, Chile

ABSTRACT This is the first time that the genus *Dodecaceria* is reported in shell galleries of the red abalone *Haliotis rufescens*. The worms measure up to 60-mm long with about 120 setigers and have a brown-greenish color. Previously Rozbaczylo and Carrasco (1996) mentioned the presence of this species in the shells of the gastropod molluscs *Fissurella maxima* and *Concholepas concholepas* and in the bivalve *Aulacomya ater*. Hernández et al. (2001) reported it in the shell of the barnacle *Austromegabalanus psittacus* in Concepción, Chile.

KEY WORDS: abalone, boring polychaetes, epibionts, Cirratulidae, *Dodecaceria*

INTRODUCTION

Boring polychaetes frequently infest the shells of aquacultured mollusc species. These polychaetes can cause severe damage to the mollusc shells, affecting the fitness of their hosts (Blake & Evans 1973, Handley & Berquist 1997, Cáceres-Martínez et al. 1998, Martin & Britayev 1998, Read 2004, McDiarmid et al. 2004) and often causing financial loss to aquaculturists. At least three families of boring polychaetes have been reported in the literature: Spionidae, Sabellidae, and Cirratulidae.

The cirratulids of the genus *Dodecaceria* are well known in literature as borer polychaetes. They can perforate practically any type of calcareous substance, such as live or dead mollusc shells, barnacles and coralline algae without showing a preference to any specific species. However, some of the species of this genus are not considered strictly perforators but as secondary perforators, because they occupy and adapt to vacant diggings done by primary perforators.

Morphologically, it is characterized by a blunt prostomium forming a hood over its mouth. The mouth segment is long and achaetous but with two strong fluted and grooved palps in the joint with the 1st setiger. It has two to eight pairs of gill filaments in the buccal segment and the first few segments. All the bristles are simple and include capillaries and strong acicular hooks with spoon shape ends.

There are only three reports regarding Cirratulidae polychaetes infection on native and exotic molluscs of commercial importance in Chile (Carrasco 1977, Rozbaczylo & Carrasco 1996, Oliva & Sánchez 2005).

Separating the Spionidae family, the two other families of boring polychaetes found in Chile were represented by fewer species (two species belonging to Cirratulidae and one species of Sabellidae). The two Cirratulidae species (*Dodecaceria choromyticola* and *D. cf. opulens*) have been reported infesting native and exotic hosts of economic importance on the Chilean coast. However, the economic effects of the infestation by *Dodecaceria* in culture centers on the Chilean coast are largely unknown, which is of concern especially considering that *Dodecaceria* is a reported pest in scallop cultures (*Placopecten magellanicus*) in New England (Blake 1969, Martin & Britayev 1998).

According to Moreno et al. 2006, *Dodecaceria choromyticola* is only observed in sea-based aquaculture facilities.

*Corresponding author. E-mail: nrozbac@bio.puc.cl

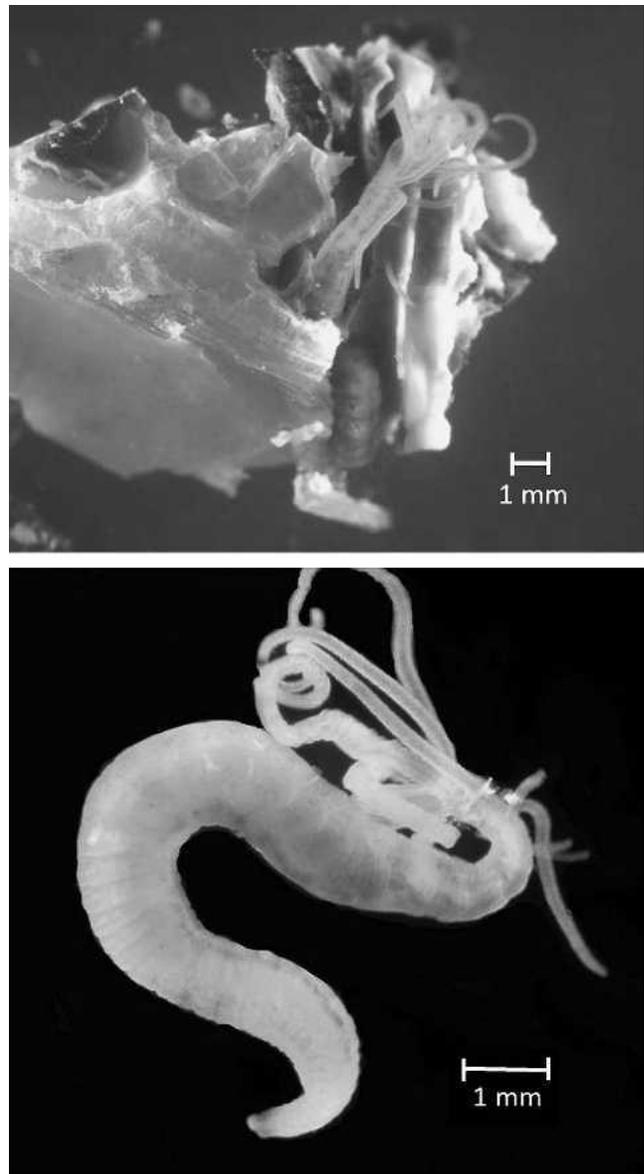


Figure 1. *Dodecaceria* in abalone shell. The upper image shows the worm inside of a gallery in a red abalone shell. The lower image shows a cirratulid worm extracted from shell.

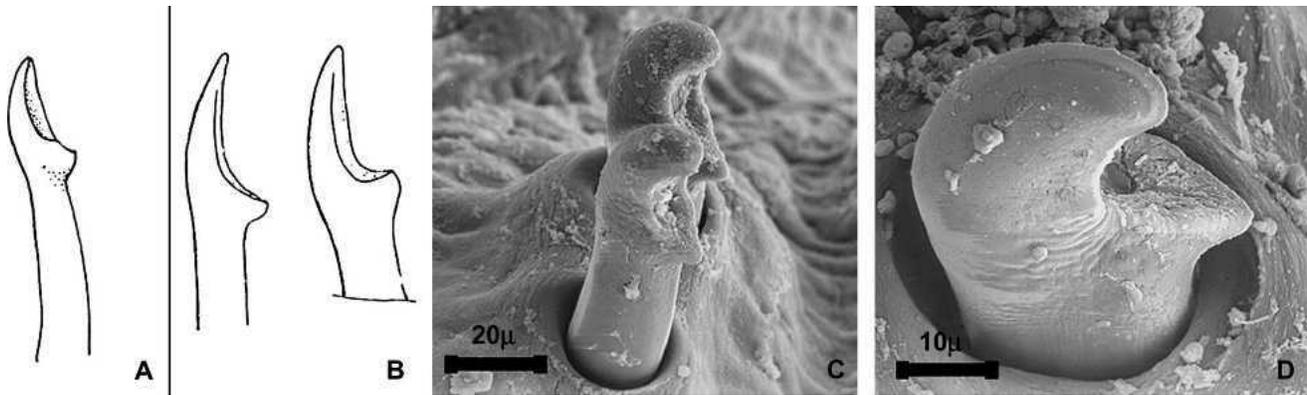


Figure 2. Neuropodial setae. A, *D. opulens*; B, *D. choromytilicola*; C and D, general view and magnification of the samples found in red abalone shells respectively.

On the other hand, Vargas et al. (2005) studied the polychaete associated to abalone culture in Southern Chile and do not register the presence of any member of the genus *Dodecaceria*.

This study constitutes the first record of the genus *Dodecaceria* in red abalone *Haliotis rufescens* shells.

MATERIAL AND METHODS

The analyzed worms were obtained from shells of the red abalone *Haliotis rufescens* collected from a land based abalone farm located in Caldera, Chile (26°57' S, 70°48' W). Two samples of thirty abalone each one were analyzed, the first in the fall and the other 30 was taken in spring-summer. All the abalone sampled belong to different batch produced in the farm.

These analyses were conducted to this abalone samples as a complementary results to the Active Vigilance Program ("Programa de Vigilancia Activa") of the National Fisheries Service (Servicio Nacional de Pesca, SERNAPESCA), national program to monitor abalone and oyster aquaculture centers in Chile for high risk diseases. This program consists in semiannual monitoring (fall and spring-summer) in aquaculture centers for the presence of specific high risk diseases in mollusc species.

The abalone shells were measured (maximum shell length) and separated from soft tissues by cutting the adductor muscle

and the shell was crushed to obtain the live polychaetes. The breakage of the shell was conducted using a pliers, beginning from the shell margin to the apex. Once the shells was fractured in several pieces the polychaetes detected were carefully separated using a nipper, and washed in saltwater to clean it from small pieces of shell and debris, taking advantage of the size of the cirratulids and the weakness of the shell in the surrounding area where the cirratulids are located. This technique allows to obtain live individuals instead of the decalcification.

The obtained material was separated from shell particles and observed in a Leica stereomicroscope model S6D. The polychaetes of the family Cirratulidae were fixed in 5% glutaraldehyde for scanning electronic microscope (SEM), to identify external structures of taxonomic importance. The microscope used for SEM was the Zeiss 940 model.

The taxonomical identification was carried out using the papers of Day 1967, Fauchald 1977, Carrasco 1977, and Gravier 1908.

RESULTS

The mean size of the analyzed abalones was 9.3 cm (sd = 1.6 cm). Only six of the total shells analyzed showed the presence of cirratulids polychaetes. Most of the individuals collected

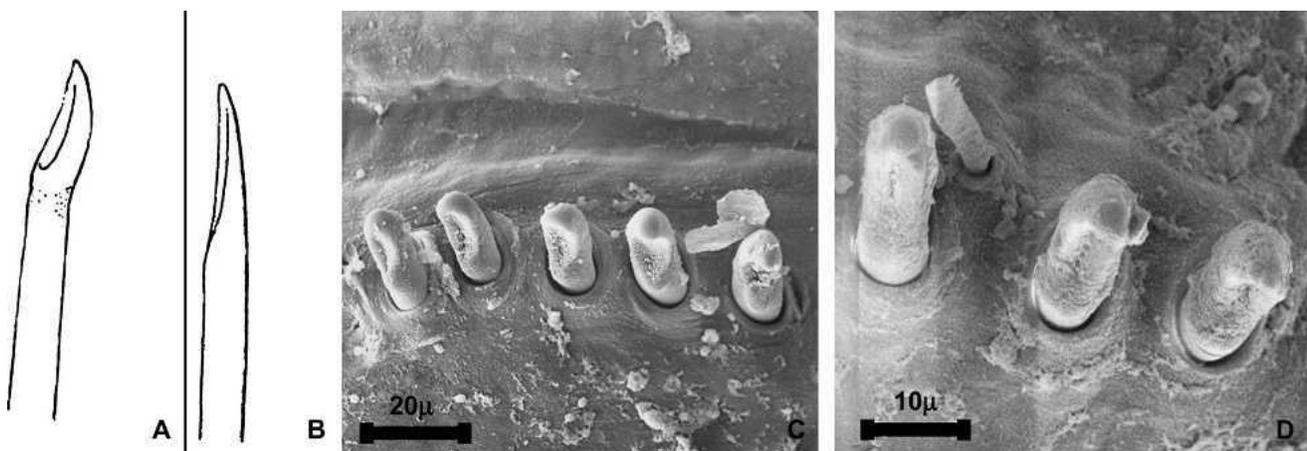


Figure 3. Notopodial setae. A, *D. opulens*; B, *D. choromytilicola*; C and D, general view and magnification of the samples found in red abalone shells respectively.

belong to the family Spionidae. The six cirratulids gathered were identified as adults belonging to the genus *Dodecaceria*, mean size 15 mm (± 3), characterized by a blunt prostomium forming a hood over its mouth. The buccal segment is long and achaetous but with two strong fluted palps in the joint with the first setiger. It has two to eight pairs of gill filaments in the mouth segment and the first few segments (Fig. 1). All bristles are simple and include capillaries and strong acicular hooks spoon shaped (Figs. 2C, 2D, 3C, 3D).

The comparison of the morphology of the neuropodial and notopodial setae obtained using SEM in the current individuals with the original drawings of *D. opulens* (Figs. 2A, 3A) and *D. choromytilicola* (Figs. 2B, 3B) shows slight differences with both species. On the other hand, these differences could be magnified considering the higher detail level achieved by SEM. Figures 1, 2 and 3 show the main taxonomic structures compared

The setae analyses suggest that there is a close morphological relation between the current specimens and *D. choromytilicola* and *D. opulens*, existing some slight differences in the curvatures of the neuropodial hooks.

DISCUSSION AND CONCLUSION

Of the 5 species belonging to the genus *Dodecaceria* registered in Chile (*D. opulens*, *D. choromytilicola*, *D. fusticola*, *D. gallardoii*, and *D. multifiligera*), only the first two are

probably related to the individuals isolated from abalone shells, the rest do not correspond morphologically, neither do habits in molluscs shells.

The characterization of the specimens at the species level is difficult because the figures showed previously in literature are based on light microscopy. This is the first SEM analysis carried out to *Dodecaceria* samples, the comparison between images obtained by both techniques is complicated because of the SEM gives a higher detail level. The differences found in setae shapes could indicate two options: this species correspond to one of the *Dodecaceria* species described associated to shell mollusc in Chile (*D. opulens* or *D. choromytilicola*) or correspond to a new species in the genus *Dodecaceria*.

The polychaetes that are normally described as important because of its high impact to the mollusc shells, especially in abalones, are those pertaining to the family Spionidae, the cirratulids are described as a secondary shell borer. Nevertheless, this worms form galleries on shells wider than polydorids, being able to cause severe damage on extensive infestations.

This work constitutes the first report of the presence of the genus *Dodecaceria* forming galleries, in the shell of the red abalone *Haliotis rufescens*. Further studies are required to elucidate the status of the cirratulid species present in abalone shells in Chile, specially the comparison with cirratulids collected previously in native molluscs and described in literature.

LITERATURE CITED

- Blake, J. A. 1969. Systematics and ecology of shellboring polychaetes from New England. *Am. Zool.* 9:813–820.
- Blake, J. A. & J. W. Evans. 1973. Polydora and related genera as borers in mollusk shells and other calcareous substrates. *Veliger* 15:235–249.
- Cáceres-Martínez, J., P. Macías-Montes de Oca & R. Vásquez-Yeomans. 1998. Polydora sp. infestation and health of the pacific oyster *Crassostrea gigas* in Baja California, NW México. *J. Shellfish Res.* 17:259–264.
- Carrasco, F. D. 1977. *Dodecaceria choromytilicola* sp.n. (Annelida, Polychaeta, Cirratulidae) perforador de *Choromytilus chorus* (Mytilidae). *Bol. Soc. Biol. Concepción* 51:63–66.
- Day, J. H. 1967. A monograph on the Polychaeta of Southern Africa. *British Museum Nat. Hist. Publ.* 656:878.
- Fauchald, K. 1977. The polychaete worms. Definitions and keys to the orders, families and genera. *Nat. Hist. Museum LA County Science Series* 28:1–190.
- Gravier, C. 1908. Sur les Annélides polychètes rapportées par M. le Dr. Rivet de Payta (Pérou). (Suite). *Bull. Mus. Hist. Nat. Paris* 14:40–44.
- Handley, S. J. & P. R. Berquist. 1997. Spionid polychaete infestations of intertidal pacific oysters *Crassostrea gigas* (Thunberg), Mahurangi Harbour, northern New Zealand. *Aquaculture* 153:191–205.
- Hernández, C. E., G. Muñoz & N. Rozbaczylo. 2001. Poliquetos asociados con *Austromegabalanus psittacus* (Molina, 1782) (Crustacea: Cirripedia) en Península Gualpén, Chile central: biodiversidad y efecto del tamaño del sustrato biológico. *Revista de Biología Marina y Oceanografía* 36:99–108.
- Martin D & TA Britayev (1998) Symbiotic polychaetes: review of known species. *Oceanog. Mar. Biol. Ann. Rev.* 36:217–340.
- McDiarmid, H., R. Day & R. Wilson. 2004. The ecology of polychaetes that infest abalone shells in Victoria, Australia. *J. Shellfish Res.* 23:1179–1188.
- Moreno, R., P. Neill & N. Rozbaczylo. 2006. Native and non-indigenous boring polychaetes in Chile: a threat to native and commercial mollusc species. *Rev. Chil. Hist. Nat.* 79:263–278.
- Oliva, M. & M. Sánchez. 2005. Metazoan parasites and commensals of the northern Chilean scallop *Argopecten purpuratus* (Lamarck, 1819) as tool for stock identification. *Fish. Res.* 71:71–77.
- Read, G. 2004. Guide to New Zealand shell polychaetes. National Institute of Water and Atmospheric Research, New Zealand (NIWA). Web publication. <http://biocollections.org/pub/worms/nz/Polychaeta/ShellPoly/NZShellsPolychaeta.htm>.
- Rozbaczylo, N. & F. Carrasco. 1996. Polychaete annelids associated to mollusc shellfish shells in the Chilean coast. *J. Med. Appl. Malacol.* 8:98.
- Vargas, L., M. Quijón & C. Bertrán. 2005. Polychaete infestation in cultured abalone (*Haliotis rufescens* Swainson) in Southern Chile. *Aquacult. Res.* 36:721–724.