

A new species of Nudibranchia of the genus *Doriopsilla* Bergh
(Gastropoda, Opisthobranchia) from South Africa

Antonio S. PERRONE

Via Palermo 7, 73014 Gallipoli, Italy

A new species of the nudibranch genus *Doriopsilla* Bergh, 1880, *D. debruini*, is described from Hout Bay, South Africa. The new species is distinguished externally by a number of large dark brown patches, the presence of high rhinophore sheaths and a very deep notch on the anterior foot. Internally the arrangement of the organs is typical for the genus with the presence of a large female gland and a flat prostatic gland. Differences between the known species are tabulated.

Key words: Opisthobranchia, Nudibranchia, Dendrodorididae, *Doriopsilla*, South Africa, taxonomy.

INTRODUCTION

The genus *Doriopsilla* (family Dendrodorididae) was established by Bergh (1880) and the type species, *Doriopsilla areolata*, was described from the Mediterranean Sea. Further *Doriopsilla* species are known from different seas (Alder & Hancock, 1864; D'Oliveira, 1895; Baba, 1949; Marcus, 1961; Burn, 1962, 1989; Marcus & Marcus, 1967; Edmunds, 1968; Meyer, 1977; Valdés & Behrens, 1998; Gosliner, Schaefer & Millen, 1999, etc.). Some *Doriopsilla* species were ascribed to *Dendrodoris* (Allan, 1933; Pruvot-Fol, 1951, 1954; Behrens, 1980, 1991; McDonald & Nybakken, 1981; McDonald, 1983; Baba, 1933, 1949) since the two genera are superficially similar. Recently the genus *Doriopsilla* was reviewed (Valdés, 1996; Valdés & Ortea, 1997) but the number of valid species is uncertain. Four species are known from South Africa (Bergh, 1907; Gosliner, 1987) and only two of these are named. One of the unnamed South African species shows the typical habitus of *Doriopsilla* but with a peculiar pattern consisting of large dark brown patches on a pale brown notal background. The present species is part of a collection of nudibranchs from South Africa and it is here described as a new species.

METHODS

Living specimens were observed in the field, collected by SCUBA and relaxed in a 7% Mg. Cl₂ solution mixed with an equal volume of seawater or frozen in seawater. The specimens were fixed in a 10% buffered formalin – seawater solution and preserved in 70% ETOH. The preserved material was dissected under a Leica MZ microscope and anatomical illustrations were made using a drawing tube. Anatomical preparations were stained with methylene blue or carmine and studied by light microscopy.

DESCRIPTION

***Doriopsilla debruini* spec. nov. (figs 1A –B, 2A-C, 3A- F, 4A –B)**

Doriopsilla sp. 1, Gosliner, 1987: 89, fig. 150.

Material. — South Africa, Cape Peninsula, (1) Hout Bay, 1-10 m depth, under stone, XII.1999, B. De Bruin, 1 specimen, microscope slides, colour transparencies, ASP 5357; (2) Hout Bay, 1-10 m depth, under stones, XII.1999, B. De Bruin, 2 specimens, microscope slides, colour transparencies, ASP 5400 – 5401; (3) Hout Bay, 1-10 m depth, under stone, XII. 1999, B. De Bruin, 1 specimen, colour transparencies (holotype), Museum of Zoology, Roma; (4) Hout Bay, 1- 10 m depth, under stones, XII. 1999, B. De Bruin, 2 specimens, microscope slides, colour transparencies, ASP 5403 – 5404.

Morphology. — The living specimens have a rigid notum, with a rough texture stiffened by a subepidermal network of needle-shaped calcareous spicules, and range from 23-37 mm in length (fig. 1A-B). The entire dorsum is covered with rounded tubercles of different sizes stiffened by needle-shaped calcareous spicules (fig. 3A). These spicules are radially arranged and their points are slightly projecting from the epidermis. The background colour of the notum and the foot is pale brown. The pattern on the dorsum consists of a number, usually more than 20, of dark brown patches (fig. 2A-C). The patches have a uniform pigmentation but in some specimens the centre of each patch is paler than the edge (fig. 3A). The largest tubercles are sparsely distributed but frequent on the central notum, slowly decreasing in size towards the margin. The orange brown rhinophores may be withdrawn into high sheaths. Each rhinophoral sheath is provided with 8 or more tubercles on its upper margin (fig. 3C). The rhinophores are perfoliate with more than 20 oblique lamellae (fig. 3B). There are nine tripinnate gills surrounding an eccentric strong anal papilla. The oral tentacles are long, with a ventral groove. They are fused only on their proximal tract and developed in a transversal direction (fig. 3F). The anterior border of the foot has a deep median notch, where the buccal aperture is visible and overlies the oral tentacles.

Anatomy. — The mouth (fig. 3F) leads, through a buccal vestibule, into a strongly muscular pharyngeal bulb, oval in shape and without radula. The tubular pharynx passes through the central nerve ring leading into the straight, cylindrical oesophagus (fig. 4A). Then it enters the brown digestive gland. The intestine comes to the surface in front of the heart. It crosses the proximal aorta and curves to the right, reaching the anal papilla with a loop. Some specimens show a round protuberance at the point of the intestinal emersion (pyloric caecum), but in large specimens this is not evident. The nervous system has the typical arrangement of the genus, with the buccal ganglia close by the central ring. The reproductive system is characterized by a bulky, pink coloured female gland (nidamental gland plus white mucous gland). The ovotestis is visible on the digestive gland as a pale yellow layer on the maroon background. A short hermaphroditic duct leads into an elongate and convoluted ampulla. The ampulla becomes narrower and enters the female gland. The vaginal duct and the proximal deferent duct enter the female gland at the same point (fig. 4B). The prostatic gland is a large flattened lobe covering the whitish vesicles and part of the female gland. The deferent duct is wider than the vaginal duct (fig. 4B), running together (in fig. 4B these two ducts are spaced out) into a common atrium. Penial hooks are hardly observed on the internal wall of the distal deferent duct with no apparent regular arrangement. Proximally the vaginal duct ends with

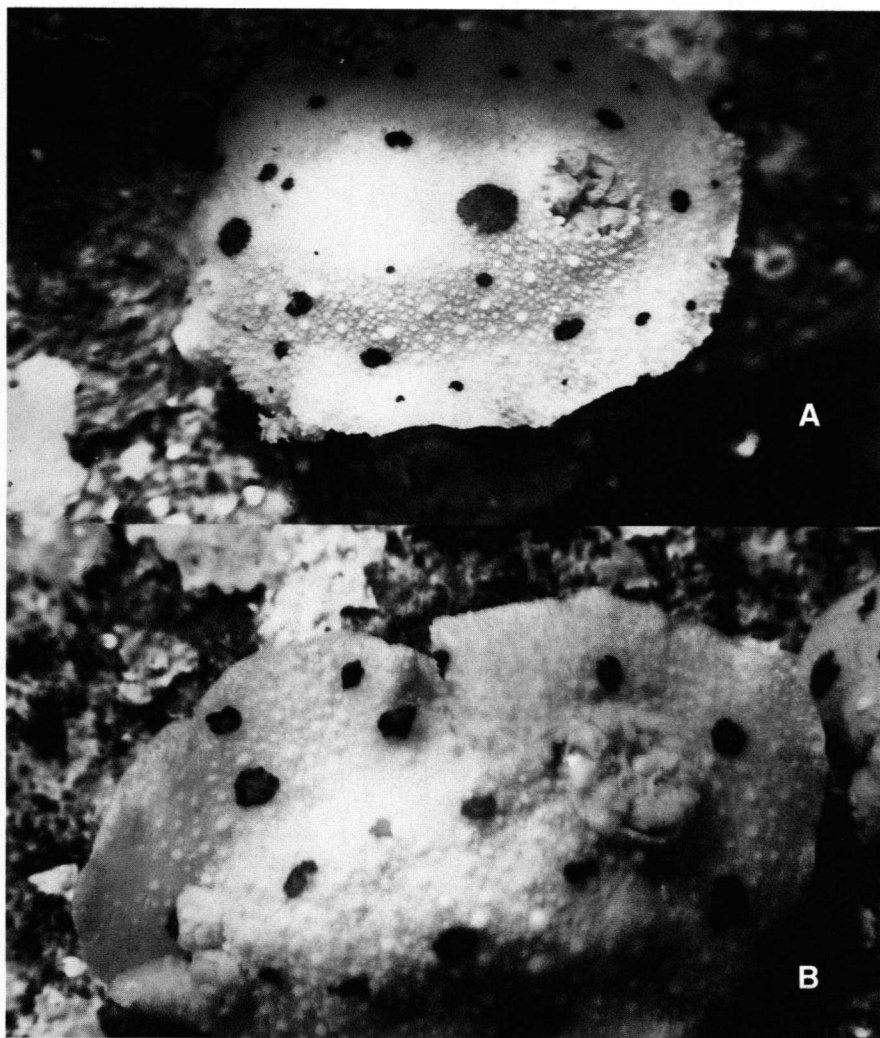


Fig. 1. A, *Doriopsilla debuini*, Hout Bay, South Africa, 26 mm long; B, *D. debuini* holotype, Hout Bay, South Africa, 28 mm long; photographs A. S. Perrone.

a soft bag-shaped bursa copulatrix. The aorta runs from the heart to a narrow and flat pale coloured blood gland (fig. 4A). The heart and the aorta are ochre or dark red in fresh material.

Ecology. — Specimens of *Doriopsilla debuini* were encountered under stones in subtidal communities. No associated sponge was observed.

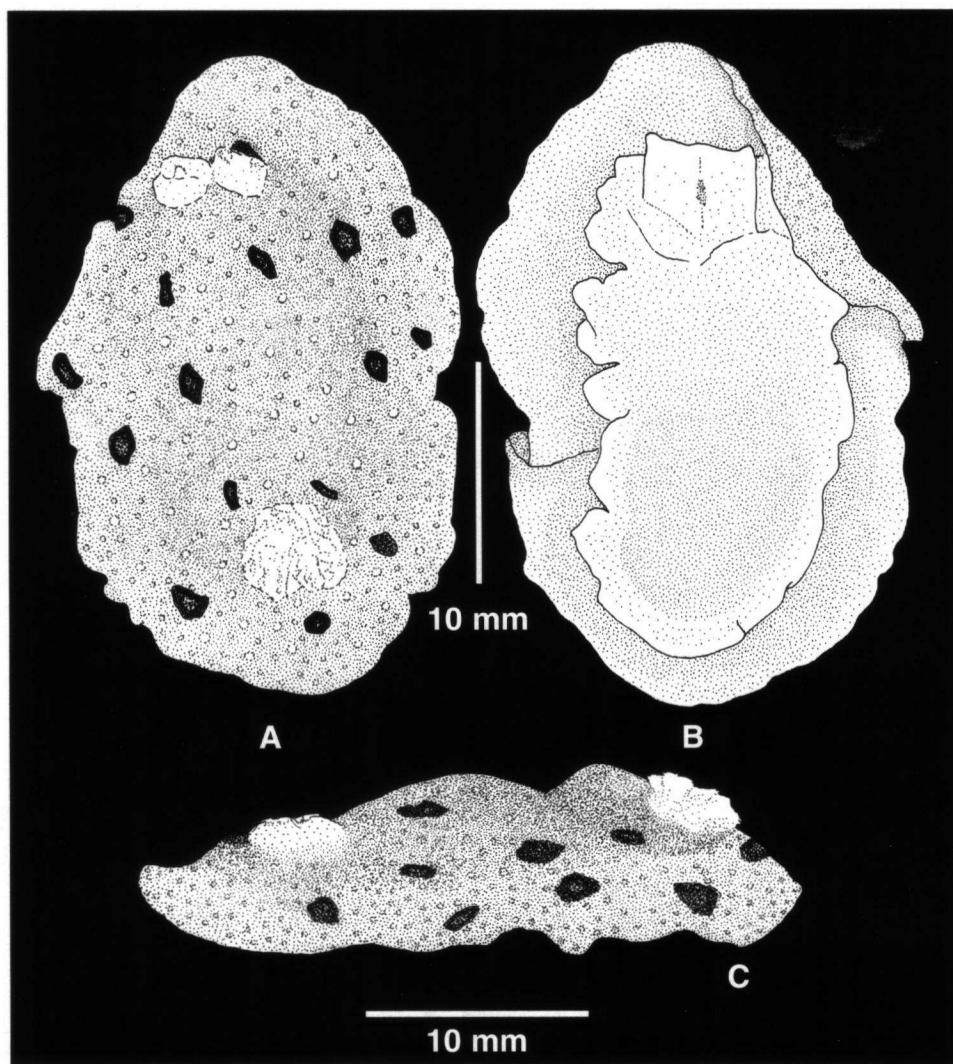


Fig. 2. *Doriopsilla debruini*, pattern. A, dorsal view; B, ventral view; C, side view.

Distribution. — *Doriopsilla debruini* spec. nov. is known only from Hout Bay, South Africa.

Etymology. — The epithet is after the collector, Bruno De Bruin.

Discussion. — *Doriopsilla* and *Dendrodoris* are both included in the family Dendrodorididae. The two taxa share the absence of a radula and the labial cuticle as a consequence of a convergent sucking feeding method. In both taxa the oral tentacles are reduced but show a variety of shapes and the deferent duct is armed with hooks,

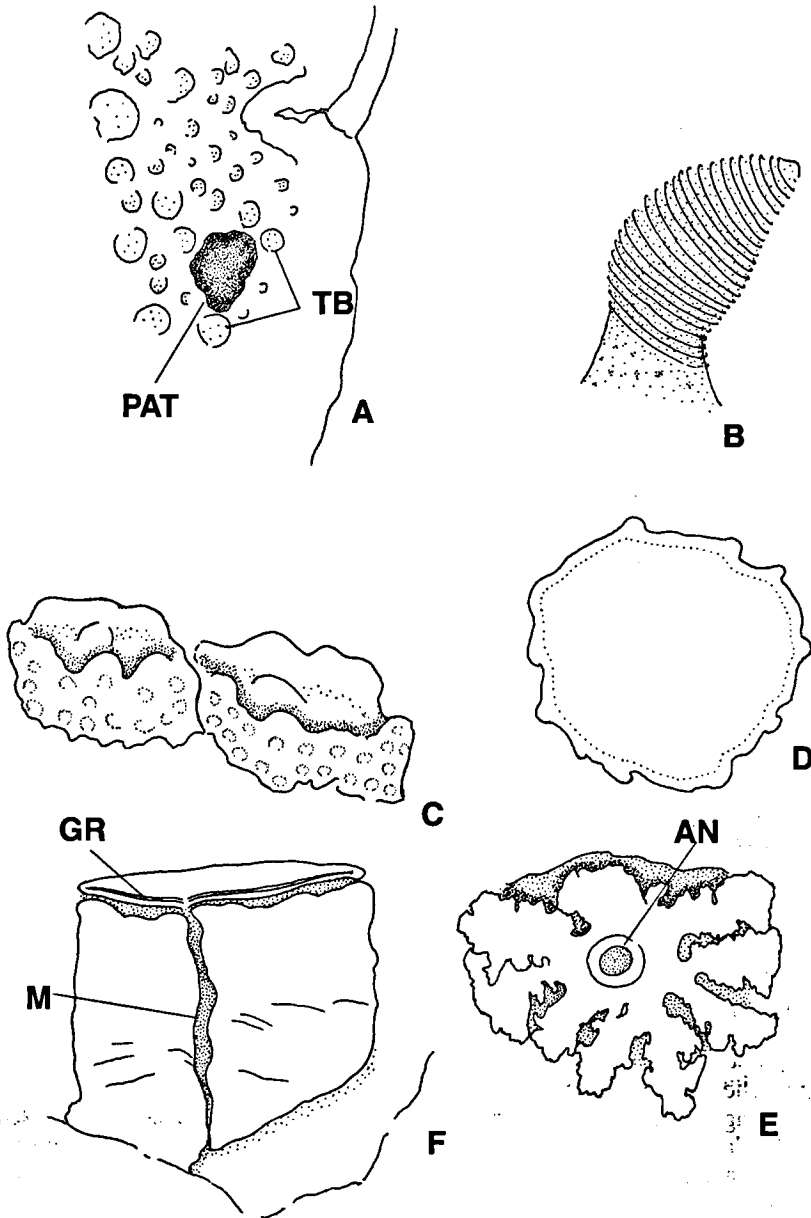


Fig. 3. *Doriopsilla debris*, morphology. A, arrangement of the notal tubercles; B, rhinophore; C, rhinophore sheaths; D, upper margin of the gill pocket; E, gill circlet; F, anterior foot and oral tentacles. Abbreviations: AN, anus; GR, groove; M, mouth; PAT, patch on the notum; TB, tubercles.

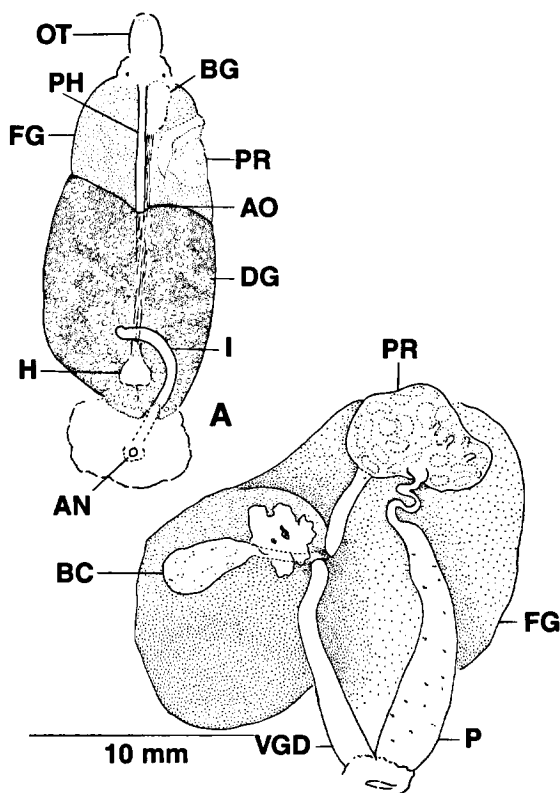


Fig. 4. *Doriopsilla debruini*, anatomy. A, dorsal view of the anatomy; B, dissected reproductive organs, the ampulla is omitted. Abbreviations: AN, anus; AO, aorta; BC, bursa copulatrix; BG, blood gland; DG, digestive gland; FG, female gland; H, heart; I, intestine; OT, oral tube; P, penis; PH, tubular pharynx; PR, prostatic gland; VGD, vaginal duct.

Doriopsilla differs from *Dendrodoris* in the following characters: (1) a rigid body stiffened by spicules (spicules are present in *Dendrodoris* during the juvenile stage); (2) a developed network of spicules in the notum and foot, often with a regular arrangement; (3) tubercles stiffened by spicules; (4) left eccentric position of the anus in the gill circlet; (5) a groove on the reduced oral tentacles; (6) absence of the ptyaline gland; (7) position of the buccal ganglia close by the central ring; (8) the proximal connection of the seminal vesicles. The flat shape of the prostate is a widespread feature and it was proposed as a character of diagnostic value for the genus *Doriopsilla* (Valdés & Ortea, 1997). However, since at least three species of *Doriopsilla* have a tubular prostatic gland (table 1), the flat prostate should not be a diagnostic character of the genus.

Doriopsilla appears to be a not very diverse genus but data obtained from literature are not sufficient for an adequate comparison of all its members (table 1). The new species, *D. debruini*, has the diagnostic characters of *Doriopsilla* and clearly belongs to this genus.

It shares the background notal colour with *Doriopsilla laevis* Bergh, 1905, but the latter is a poorly known species and its taxonomic status should be considered uncertain. A dark phase of *Doriopsilla peculiaris* was reported by Burn (1989). Its colour resembles that of *D. debruini* but it differs in the cream tonality and the pattern of opaque white spots. The presence of large dark brown patches on the notum is a unique pattern among *Doriopsilla* spp., while it is widespread in *Dendrodoris*. External autapomorphies of *D. debruini* are the following: (1) presence of high rhinophore sheaths; (2) a very deep notch on the anterior foot. *D. debruini* has long and transversally developed oral tentacles. Long tentacles are reported for *D. pharpha* (Valdés & Ortea, 1997) and *D. albolineata* (= long crest) (Edmunds, 1968).

The remaining *Doriopsilla* species have greatly reduced tentacles, often reported as fused. A long ventral groove is present from the base to the point of both the oral tentacles. Grooves on the tentacles were reported for three species with small tentacles: *D. pelseneeri*, *D. spaldingi* and *D. gemela*. However, this character may be present but overlooked in other less known species. The flat shape of the prostate is common in the genus but the presence of diverticula was reported for *D. janaina* and *D. rowena* (digitate prostate in *D. gemela*). The spicules in the notum of *D. debruini* are arranged in small groups. A regular network with radially disposed spicules is the common arrangement in the genus. Among the four South African species, *D. capensis* and *D. sp. 2* share a similar habitus being white with "nodules" or tubercles of the same colour.

D. miniata shows an overall resemblance to *D. areolata* being dark yellow or pale orange with a pattern made of a white network.

The colour pattern of *D. debruini* clearly sets it apart from these three known species.

ACKNOWLEDGMENTS

I am grateful to Bruno De Bruin and Dave Pollack for their help with the field collection in South Africa.

REFERENCES

- ALDER, J. & A. HANCOCK, 1864. Notice of a collection of nudibranchiate Mollusca made in India by Walter Eliot Esq., with descriptions of several new genera and species. — Transactions of the Zoological Society of London 5: 113-147.
- ALLAN, J., 1933. Opisthobranchs from Australia. — Records of the Australian Museum 18: 443-450.
- BABA, K., 1933. Supplementary note on the Nudibranchia collected in the vicinity of the Amakusa marine biological laboratory. — Annotationes Zoologicae Japonenses 14: 273-283.
- , 1949. Opisthobranchia of Sagami Bay collected by His Majesty, the Emperor of Japan: 1 – 194. Tokyo.
- BEHRENS, D.W., 1980. Pacific coast nudibranchs, a guide to the opisthobranchs of the Northeastern Pacific: 1-112. Los Osos.
- , 1991. Pacific coast nudibranchs, a guide to the opisthobranchs. Alaska to Baja California, 2nd ed.: 1-107. Monterey.
- BERGH, R., 1880. Die Doriopsen des Mittelmeeres. — Jahrbücher der Deutschen Malakozoologischen Gesellschaft 7: 297-328.
- , 1902. The Danish expedition to Siam 1899-1900. I. Opisthobranchiata. — Det Kongelige Danske Videnskabernes Selskabs Skrifter. 6 Raekke. Naturvidenskabelig og Mathematisk Afdeling 12: 153 – 218.

- , 1905. Die Opisthobranchiata der Siboga-Expedition. — Monographie 50: 1-248. Leiden.
- , 1907. The Opisthobranchiata of South Africa. — Transactions of the South African Philosophical Society 17: 1-144.
- BURN, R., 1962. Notes on a collection of Nudibranchia from South Australia with remarks on the species of Basedow and Hedley, 1905. — Memoirs of the National Museum, Melbourne 25: 149-171.
- , 1969. A memorial report on the Tom Crawford collection of Victorian Opisthobranchia. — Journal of the Malacological Society of Australia 12 : 64-106.
- , 1989. Opisthobranchs (Subclass Opisthobranchia). In: SHEPHERD S.A. & I.M. Thomas, eds., Marine invertebrates of Southern Australia Part. II: 725-788. Adelaide.
- D'OLIVEIRA, M.P. 1895. Opisthobranches du Portugal de la collection de M. Paulino d'Oliveira. O Instituto. — Revista Scientifica e Litteraria, Coimbra 42: 574-592.
- EDMUNDS, M. 1968. Opisthobranchiate Mollusca from Ghana. — Proceedings of the Malacological Society of London 38: 83-100.
- GOSLINER, T., 1987. Nudibranchs of Southern Africa. A guide to opisthobranch molluscs of Southern Africa: 1-136. Monterey.
- , M.C. SCHAEFER & S.V. MILLEN, 1999. A new species of *Doriopsilla* (Nudibranchia: Dendrodorididae) from the Pacific coast of North America, including a comparison with *Doriopsilla albopunctata* (Cooper, 1863). — The Veliger 42: 201-210.
- MACFARLAND, F.M., 1966. Studies of opisthobranchiate mollusks of the Pacific coast of North America. — Memoirs of the California Academy of Sciences 6 : 1-546.
- MARCUS, E., 1961. Opisthobranchia from North Carolina. — Journal of the Elisha Mitchell Scientific Society 77: 141-151.
- , & E. MARCUS, 1967. American opisthobranch mollusks. University of Miami Institute of Marine Sciences: 1-256. Miami.
- MEYER, K.B., 1977. Dorid nudibranchs of the Caribbean coast of the Panama Canal Zone. — Bulletin of Marine Science of the Gulf and Caribbean 27: 299-307.
- MCDONALD, G., 1983. A review of the nudibranchs of the California coast. — Malacologia 24: 114-276.
- , & J.W. NYBAKKEN, 1981. Guide to the nudibranchs of California, including most species found from Alaska to Oregon: 1-72. Melbourne.
- PRUVOT-FOL, A., 1951. Etudes des nudibranches de la Méditerranée. — Archives de Zoologie Expérimentale et Générale 88: 1-80.
- , 1954. Mollusques Opisthobranches. — Faune de France 58: 1-460. Paris.
- VALDES, A., 1996. Revision de la superfamilia Porodoridaidea Odhner en Franc, 1968 (Mollusca: Nudibranchia) en el Océano Atlántico. Ph.D. Thesis, Universidad de Oviedo.
- , & D.W. BEHRENS, 1998. A new species of *Doriopsilla* (Mollusca, Nudibranchia, Dendrodorididae) from the Pacific coast of North America. — Proceedings of the California Academy of Sciences 50: 307-314.
- , & J. ORTEA, 1997. Review of the genus *Doriopsilla* Bergh, 1880 (Gastropoda: Nudibranchia) in the Atlantic Ocean. — The Veliger 40: 240-254.
- WHITE, K. M., 1951. On a collection of molluscs, mainly nudibranchs from the Red Sea. — Proceedings of the Malacological Society of London 28 : 241-253.