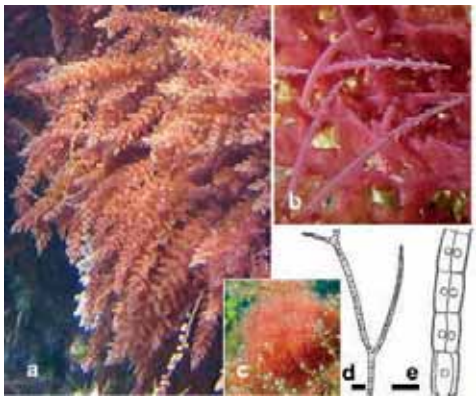
Asparagopsis armata Harvey

Relevant synonym
Falkenbergia rufolanosa (Harvey) Schmitz



Photos S. Ruitton, (Mediterranean, France). Drawings: Sauvageau, 1925a (NE Atlantic).

a. Gametophyte. b. Detail of harpoon-like branch. c. Tetrasporophyte. d, e. Details of filament. Bars: d = 50 µm; e = 30 µm.

Short description

Asparagopsis armata has a heteromorphic life history with alternation of erect gametophytes (*A. armata*) and filamentous tetrasporophyte first regarded as a distinct species (*Falkenbergia rufolanosa*). Gametophytes: medium (to 20 cm high), erect, purplish-red, much branched with cylindrical axis, 1 mm in diameter, bearing plumose branches on all sides; branches covered with indeterminate branchlets and short unbranched determinate ramuli; attachment by lateral branches with retrorse spines (barbed or harpoon-like branches); usually epiphytic on various benthic organisms; structure uniaxial; dioecious; cystocarps globular, stalked, 1-1.5 mm in diameter; spermatangial organs elongate-ovoid, stalked, 90-150 µm in diameter and 250-450 µm long. Tetrasporophyte ("*Falkenbergia*" phase): small (up to 2 cm high), filamentous, cotton-wool-like tufts, dense and much branched; filaments, 40-60 µm in diameter, with 3 periaxial cells around each axial cell; each periaxial cell cutting off inwardly a small spherical gland cell; tetrasporangia forming an irregular series, shortly ovoid, 25-35 µm in diameter, cruciately divided.

Distinguishing characteristics

Gametophytes: the axes plumose, purplish-red, usually epiphytic, and the lateral branches bearing retrorse spines (harpoon-like branches) are distinctive; confusion possible with:
- *A. taxiformis* (Delile) Trevisan de Saint-Léon: thallus larger and more plumose, dark brown-red, fading to grey-red in colour, without harpoon-like branches.

Tetrasporophyte: axes with 3 periaxial cells is distinctive of a *"Falkenbergia"* phase. Tetrasporophytic phases of *Asparagopsis* species are indistinguishable without fine morphological and genetic studies.

Biology / Ecology / Habitat

Subtidal communities; tetrasporophytes present all year round, but most obvious in late winter - spring; gametophytes only from winter to early summer.

Distribution

Because the tetrasporophytic phases of the *Asparagopsis* species are indistinguishable, only the distribution of gametophytes (and tetrasporophytes if confirmed by molecular studies) is considered here. **Worldwide**: south-western Pacific, described from Western Australia and Tasmania (Harvey, 1855a), New Zealand, Chatham Islands; south-eastern Pacific (introduced), Chile; north Pacific (introduced), Japan, California, San Diego; Indian Ocean, South Africa, Burma, India; north-eastern Atlantic, France (introduced, first observation in 1922; Sauvageau, 1925a), Netherlands to Senegal. **Mediterranean**: recorded first in 1923 from Algeria (Sauvageau, 1925b); successively recorded in France, Banyuls (Hamel, 1926), Marseille (1927, M. Verlaque Herbarium); Monaco (Ollivier, 1929); Corsica (Coppejans and Boudouresque, 1983); Italy, Naples (Cinelli, 1971), Sicily (Giaccone, 1972), north Adriatic Sea (Giaccone, 1978), Sardinia (Cossu *et al.*, 1992), Puglia (Cecere *et al.*, 1996), Tuscany (Piazzi *et al.*, 1999), Liguria (Mangialajo *et al.*, 2006), Mar Piccolo di Taranto (Cecere and Petrocelli, 2009); Turkey (Güven and Ötzig, 1971; Taşkin *et al.*, 2008a); Greece, south-eastern Aegean Sea, Rhodes Island (Koussouris *et al.*, 1973), Ionian Sea (Schnetter and Schnetter, 1991), west Aegean Sea (Skoufas and Tsirika, 2006; Tsiamis *et al.*, 2010), Messiniakos Gulf (Bardamaskos *et al.*, 2009), Cyclades Islands (S. Giakoumi in Nicolaidou *et al.*, 2012); Spain, Catalonia (Ballesteros, 1981), Andalusia (Hacohen Domené, 2008); Tunisia (Meñez and Mathieson, 1981); Croatia (Špan and Antolic, 1983; Špan *et al.*, 1989); Morocco (Conde Poyales, 1984); Maltese Islands (Cormaci *et al.*, 1997); Cyprus (Cirik *et al.*, 2000; Taşkin *et al.*, 2013); Slovenia (Lipej *et al.*, 2012). As a matter of fact, the arrival of this species in the Mediterranean Sea might be as old as the late 19th century; indeed, according to Ní Chualáin *et al.* (2004) the description of *Polysiphonia hillebrandii* Bornet (= "*Falkenbergia hillebrandii* (Bornet) Falkenberg", the tetrasporophyte later attributed to *A. taxiformis*) from Elba (Ardissone, 1883) may represent the first Mediterranean report of *A. armata*.

Mode of introduction

Shipping; secondary dispersal by fishing and shipping.

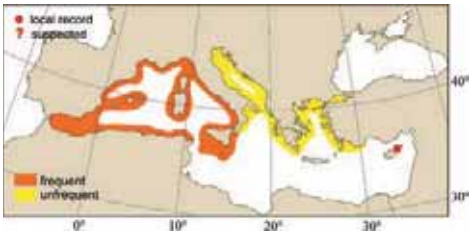
1st Mediterranean record
Elba, Italy, 1883 [1880] ? – Algeria, 1925 [1923].

Establishment

Well established.

Importance to humans

Invasive; *A. armata* can be a nuisance to commercial fishermen, clogging their nets.



Key references

• Ardissone F., 1883. Phycologia mediterranea. Parte prima, Floridee. *Memorie della Società Crittogamologica Italiana, Varese*, 1: i-x, 1-516.

• Harvey W.H., 1855a. Some account of the marine botany of the colony of western Australia. *Transactions of the Royal Irish Academy,* 22: 525-566.

• Ní Chualáin F., Maggs C.A., Saunders G.W. and Guiry M.D., 2004. The invasive genus *Asparagopsis* (Bonnemaisoniaceae, Rhodophyta): molecular systematics, morphology, and ecophysiology of *Falkenbergia* isolates. *Journal of Phycology*, 40: 1112-1126.

• Sauvageau C., 1925a. Sur la naturalisation en France d'une Floridée australasienne de l'iode (*Asparagopsis armata* Harv.) et sur ses ioduques. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences, Paris,* 180.

• Sauvageau C.,1925b. Sur quelques algues Floridées renfermant de l'iode à l'état libre. *Bulletin de la Station Biologique d'Arcachon*, 22: 5-45.