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COMMUNICATION

AN ANNOTATED CHECKLIST OF SEA SLUG FAUNA OF GUJARAT COAST, INDIA

Piyush Vadher, Hitesh Kardani & Imtiyaz Beleem

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An annotated checklist of sea slug fauna of Gujarat coast, India

Piyush Vadher¹, Hitesh Kardani² & Imtiyaz Beleem³

^{1,2} Fisheries Research Station, Junagadh Agricultural University, Sikka, Jamnagar, Gujarat 361140, India.

³ Office of the Superintendent of Fisheries (Commissioner of Fisheries, Agriculture, Farmer Welfare and Co-operation Department), Mangrol harbour, Mangrol, Junagadh, Gujarat, 362226, India.

¹vadherpiyush4@gmail.com, ²hiteshkardani@gmail.com (corresponding author), ³imtiyazbelim7@gmail.com

Abstract: An annotated checklist of sea slugs from Gujarat coastal waters was prepared, based on published literature and field observations from 2014–2019. Ninety-five species from 62 genera belonging to 29 families were recorded. Species are listed with synonyms and distribution status.

Keywords: Distribution, Gastropoda, Opisthobranch.

વર્ષ ૨૦૧૪ થી ૨૦૧૯ દરમિયાન દરીયાકિનારે કરાયેલ ક્ષેત્રીય અવલોકનો તેમજ પુર્વ પ્રકાશિત સાહિત્યને આધારે ગુજરાતના દરીયાકાંઠાના વિસ્તારમાંથી સમુદ્રી ગોકળગાયત્રી સુધિત યાદી તૈયાર કરવામાં આવેલ. ૨૯ કુળમાની ૬૨ જાતિની ૯૫ પ્રજાતિ નોંધવામાં આવેલ છે. પ્રજાતિની વિસ્તરણ સ્થિતી અને સમાનાર્થી નામોની યાદી સામેલ છે.

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Author details: PIYUSH VADHER is working as senior research fellow in Fisheries Research Station, JAU, Sikka. He has been involved in the research since 2014. He has been engaged in the survey, breeding and larval rearing of Pearl oyster and other molluscan and plankton culture. HITESH KARDANI is working as Assistant Professor in Fisheries Research Station, JAU, Sikka. He is involved in teaching and research since 2005. His area of interest is plankton, molluscan, crustacean and Ichthyofaunal diversity. He has been engaged in captive breeding of marine molluscan and their conservation by sea ranching of their larvae. IMTIYAZ BELEEM is working as Assistant Superintendent of Fisheries, in the Office of the Superintendent of Fisheries, Mangrol, Gujarat. He has been engaged in the research and academics since 2012 and main interest of research area is crustacean taxonomy and Marine ecology.

Author contribution: PV—survey, photography and identification of sea slugs and preparation of the draft of paper. HK—survey, photography and identification of sea slugs and preparation of the draft of paper; IB—survey, preparation of the manuscript.

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Commissioner of Fisheries
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Government of Gujarat

INTRODUCTION

Sea slugs are one of the largest groups of marine gastropods. They show a wide range of colors, designs, and patterns, including varieties of body decorations such as flaps, sensory organs, tubercles, and tentacles (Wagele & Klusmann-Kolb 2005). They are found from the polar regions to the tropics in habitats ranging from intertidal (coral reefs, mudflats, rocky shores, and tide pools) to deep sea, and in association with bryozoans, hydroids, sponges, seagrasses, and seaweeds (Wollscheid-Lengeling et al. 2001; Apte & Desai 2017). Sea slugs possess a variety of predator defense mechanisms that include autotomizing organs, chemical & ink secretion, crypticism, camouflage, and deimatic displays (Wollscheid-Lengeling et al. 2001; Apte & Desai, 2017).

There are approximately 6,000 species of sea slugs (Wagele et al. 2008), of which about half have been described from the Indo-Pacific region (Gosliner et al. 2015). Recently, Apte & Desai (2017) documented 361 species from India, with the Andaman & Nicobar Islands possessing the greatest diversity (273 species), followed by the western coast of India (121 species), Lakshadweep Islands (106 species), and the eastern coast of India (75 species).

In Gujarat, Hornell was the first to collect sea slugs from the Kathiawar coast, which were identified by Eliot (Eliot 1909; Hornell 1909). Subsequent reports were made by Gideon et al. (1957), Menon et al. (1961), Narayanan (1969, 1970, 1971), Burn (1970), Burn & Narayanan (1970), Rudman (1973, 1980, 1983), Rao & Rao (1980), Rao (2003), Raghunathan et al. (2004, 2016), Rao et al. (2004), Rao & Sastry (2005), Apte et al. (2010, 2015), Matwal & Joshi (2011), Parasharya (2012), Apte (2013), GEER (2013, 2014a,b), Prasade et al. (2013, 2015), Carmona et al. (2014), Poriya et al. (2015), Venkataraman et al. (2015), GSBTM (2015), Bhave et al. (2015), Kumari et al. (2015), Apte & Desai (2017), and Bharate et al. (2020).

Using information from these sources and field observations, we present here an annotated checklist of the sea slugs of the Gujarat coastal waters, which provides basic details of diversity and present distributions.

MATERIALS AND METHODS

Gujarat State is situated on the western coast of India, with a coastline extending for 1,600km. The Gujarat coast supports a variety of habitats, including

mangroves, coral reefs, rocky shores, mudflats, sandy shores, seagrasses, and seaweeds, contributing to a high degree of marine faunal and floral diversity. The coast is divided into three areas: the Gulf of Kachchh, Saurashtra coast, and the Gulf of Khambhat (Beleem et al. 2019). The Gulf of Kachchh is a large inlet of the Arabian sea that tapers towards the north-east and contains a Marine National Park and Sanctuary with 42 islands where coral reef and mangrove ecosystems support a high level of faunal diversity (Apte et al. 2010).

The Saurashtra coast is a locale for industry, harbors, fisheries, and tourism. The area is comprised of rocky flats, and muddy & sandy supratidal zones. The rocky coast has various substrata including zoanthid zones, coral patches, and intertidal pools & puddles, which sustain unique species diversity. The Gulf of Khambhat is about 200km long, and 20km wide in the north and up to 70km wide in the south. The Narmada, Tapi, Mahi, and Sabarmati rivers drain into the gulf to form the estuary. Khambhat comprises mudflats, muddy-sandy zones, rocky patches and sandy supratidal zone. The intertidal zone of Khambhat has sparsely scattered mangrove patches of *Avicennia marina*. This unique habitat supports several marine species.

The authors carried out extensive fieldwork in these coastal areas of Gujarat from 2014 to 2019. A majority of specimens collected are deposited in the Museum of Fisheries Research Station, Junagadh Agricultural University, Sikka. An annotated checklist was prepared based on available literature (Table 1). Scientific names, synonyms and current status were validated and confirmed with the WoRMS (World Register of Marine Species, 2019) database for current taxonomic status (WoRMS Editorial Board 2019). The species identified up to genus, grey literature, popular articles, invalid species data, and reports in local newsletters removed from the present checklist. We collected 60 specimens which have been deposited in the Museum of Fisheries Research Station, Junagadh Agricultural University, Sikka with accession number with FRSMGH-01 to FRSMGH-60. Among those 60 collected specimens, 37 were included in the present checklist (Images 1–5) and 23 species are identified up to the genus and family levels. Classification has changed due to major revisions of families, genera, and species complexes which created many confusion among the taxonomists. The present checklist follows the standard classification method of Bouchet et al. (2017).

A total of 16 species of sea slugs were removed from the present checklist, as they were formerly misidentified (Table 3).

Taxonomic notes on Gujarat sea slugs

Hornell collected seven species sea slug fauna from Gujarat during 1905–06, later identified by Eliot (1909). Among those were the new species *Antiopella indica* Eliot, 1909 (now *Janolus indica* (Eliot, 1909)), which subsequently proved to be a junior synonym of *Janolus toyamensis* Baba & Abe, 1970 (Baba 1986). Hornell wrote a note on the presence of symbiotic algae in *Melibe viridis* (Kelaart, 1858) (now *Melibe rangi* Bergh, 1875) at Kattiawar in 1909. Gideon et al. (1957) reported three species of sea slugs during the primary survey of the Gulf of Kachchh. Menon et al. (1961) reported six species of sea slugs from different coasts of the Gulf of Kutch. The first comprehensive work on sea slug fauna of Gujarat was carried out by Narayanan (1969, 1970, 1971) in different parts of the Gulf of Kachchh, who reported 25 species. Narayanan (1969) reported *Hervia militaris* from Gujarat, which was later identified as *Eolis militaris* by Burn & Narayanan (1970), later it was known as *Phidiana militaris* (Alder & Hancock, 1864). Narayanan (1969) also described *Phyllidiella zeylanica* from the Gulf of Kachchh, which was later re-described by Burn (1970). Rudman (1973, 1980, 1983) reported four species from the Gulf of Kachchh, including *Mexichromis mariei* (Crosse, 1872) (now *Chromodoris mariei* (Crosse, 1872)) and a new species *Chromodoris krishna* Rudman, 1973, after it was redescribed and given a junior synonym of *Chromodoris fidelis* Rudman (1985) which was later known as *Goniobranchus fidelis* (Kelaart, 1858) (Rudman 1985). Rudman (1980) recorded *Phidiana militaris* (Alder & Hancock, 1864) and described one new species of *Sakuraeolis gujaratica* Rudman, 1980 collected from Adatra reef, Gulf of Kachchh.

Rao (2003) recognized two valid species: *Aplysia argus* Rüppell & Leuckart, 1830 (now *Aplysia benedicti* (Eliot, 1899)) and *Aplysia cornigera* (Sowerby, 1869). Raghunathan et al. (2004) surveyed live corals along the Saurashtra coast of Gujarat, where they found *Aplysia parvula* (Mörch, 1863) as coral-associated. Rao & Sastry (2005) prepared a checklist as of 24 species of sea slugs from the literature, augmented by their surveys from different Islands and reefs of Marine National Park, Gulf of Kachchh (Gujarat). In that checklist, *Haminoea hydatis* (Linnaeus, 1758) was misidentified, being actually *Haloo natalensis* (Krauss, 1848) (Parasharya 2012).

Later, Apte et al. (2010) collected various species of sea slugs from the Gulf of Kachchh, where they recorded 33 species belonging to 19 families, of which 21 were new records from Gujarat and 13 new records for the Indian coast. Parasharya (2012) recorded a list of 43 species of sea slugs from six locations of Gulf of Kachchh

during a survey of coral associated fauna in his Ph.D. work. Six species were doubtfully identified: *Atagema alba* (O'Donoghue, 1927), *Carminodoris bifurcata* Baba, 1993, *Cratena capensis* Barnard, 1927, *Cratena peregrina* (Gmelin, 1791), *Oxynoe panamensis* Pilsbry & Olsson, 1943, and *Philinopsis taronga* (Allan, 1933), since they are not found in Indian waters (Table 3).

Carmona et al. (2014) described a new species of *Anteaeolidiella poshitra* Carmona et al., 2014 from Gulf of Kachchh. Poriya et al. (2015) recorded seven species of sea slugs belonging to six families from Saurashtra coast, among them *Phidiana militaris* was associated with *Goniopora* coral and zoanthid colony, whereas *Baeolidia palythoae* was associated with zoanthids. Venkataraman et al. (2015) reported 53 species of sea slug fauna belonging to 19 families and 33 genera from Gujarat waters after that Raghunathan et al. (2016) described and listed diversity of sea slugs of coastal waters of India where he reported 389 species of sea slugs from India among them 56 species were recorded from Gujarat coastal waters. Recently, Apte & Desai (2017) published a book of field guide to the sea slugs of India, where they reported 75 species of sea slugs fauna from the Gujarat water. They reported *Knoutsodonta brasiliensis* (Alvim et al., 2011) from Gujarat waters while the species's distribution is restricted to Brazil (Alvim et al. 2011). From Alang, Gulf of Khambhat, Porbandar, Saurashtra, Bhadrashwar, Pirotan Island, Salaya, Sikka, and Gulf of Kachchh they reported two species of *Haminoea* as *Haminoea elegans* (Gray, 1825) and *Haminoea galba* Pease, 1861 (Gideon et al. 1957; Rao et al. 2004) which are clearly incorrect and their occurrence has not been so far reported from India. Hence, a total of 16 species belonging to 11 genera and nine families were eliminated from the present checklist due to misidentification (Table 3).

RESULTS

Our annotated checklist based on the literature for sea slugs of the Gujarat coast contains 95 species from 62 genera belonging to 29 families (Table 1). A dispute was identified from the reported checklist and removed (*Hervia ceylonica* Farran, 1905), since *Hervia ceylonica* was considered a “nomen dubium” in WoRMS (MolluscaBase 2019). Synonyms of 27 species have been updated with present scientific names (Table 2). The Gulf of Kachchh with its unique and abundant coral and mangrove ecosystems has high species diversity (93 species) relative to the Saurashtra coast (30 species),

Table 1. An annotated checklist of sea slug fauna of Gujarat coast.

	Species	References
Family: Aplustridae Gray, 1847		
1	<i>Hydatina physis</i> (Linnaeus, 1758)	Okha, Lamba (Rao et al. 2004); Veraval (Rao et al. 2004; Kumari et al. 2015; Apte & Desai 2017); Gujarat (Raghunathan et al. 2016); Present study
2	<i>Hydatina zonata</i> (Lightfoot, 1786)	Bet Dwarka (Menon et al. 1961); Porbandar (Rao et al. 2004); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
Family: Pleurobranchidae Gray, 1827		
3	<i>Berthella stellata</i> (Risso, 1826)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Pirotan Island, Kalubhar Island, Poshitra Reef (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Porbandar (Apte & Desai 2017)
4	<i>Berthellina citrina</i> (Rüppell & Leuckart, 1828)	Gulf of Kachchh (Narayanan 1970; Rao & Sastry 2005; Apte et al. 2010; Apte & Desai 2017); Pirotan Island, Goose Island, Narara Reef, Kalubhar Island, Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Porbandar, Dwarka, Okha (Apte & Desai 2017); Present study
5	<i>Berthellina minor</i> (Bergh, 1905)	Okha, Pirotan Island, Dona Reef (Narayanan 1969); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
Family: Pleurobranchaeidae Pilsbry, 1896		
6	<i>Pleurobranchaea morula</i> Bergh, 1905	Pirotan Island (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
Family: Dorididae Rafinesque, 1815		
7	<i>Doriopsis granulosa</i> Pease, 1860	Gulf of Kachchh (Apte & Desai 2017); Present study
8	<i>Archidoris minor</i> Eliot, 1904	Okha (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
Family: Discodorididae Bergh, 1891		
9	<i>Atagema spongiosa</i> (Kelaart, 1858)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Narara Reef, Kalubhar Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Present study
10	<i>Atagema tristis</i> (Alder & Hancock, 1864)	Gulf of Kachchh (Apte & Desai 2017); Present study
11	<i>Atagema rugosa</i> Pruvot-Fol, 1951	Gulf of Kachchh (Apte et al. 2010; GEER 2014b; Apte & Desai 2017); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Poshitra Reef, Dwarka, Narara Reef (Bhave et al. 2015); Present study
12	<i>Jorunna funebris</i> (Kelaart, 1859)	Okha, Chakhadi (Movado) Island, Khara Mitha Chusna Island, Azad Island, Roji Island (Narayanan 1969); Pirotan Island (Narayanan 1969; Parasharya 2012); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010; GEER 2013, 2014a,b; Apte & Desai 2017); Goose Island, Narara Reef, Kalubhar Island, Ashaba Island (Parasharya 2012); Poshitra Reef (Parasharya 2012; Bhave et al. 2015); Dwarka (Bhave et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Present study
13	<i>Discodoris boholiensis</i> Bergh, 1877	Pirotan Island (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
14	<i>Platydoris pulchra</i> Eliot, 1904	Pirotan Island (Narayanan 1971)
15	<i>Thordisa villosa</i> (Alder & Hancock, 1864)	Poshitra Reef, Narara Reef (Prasade et al. 2013; Bhave et al. 2015); Gujarat (Apte & Desai 2017); Present study
16	<i>Thordisa sanguinea</i> Baba, 1955	Poshitra Reef (Bhave et al. 2015); Gujarat (Raghunathan et al. 2016)
17	<i>Peltdoris murrea</i> (Abraham, 1877)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Goose Island, Kalubhar Island (Parasharya 2012); Narara Reef (Parasharya 2012; Bhave et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Poshitra Reef, Dwarka (Bhave et al. 2015); present study
18	<i>Peltdoris rubescens</i> Bergh, 1905	Okha (Narayanan 1971)
19	<i>Carminodoris grandiflora</i> (Pease, 1860)	Gulf of Kachchh (Apte et al. 2010; GEER, 2013, 2014a,b; Apte & Desai 2017); Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Narara Reef (Bhave et al. 2015)
20	<i>Sclerodoris apiculata</i> (Alder & Hancock, 1864)	Poshitra Reef (Bhave et al. 2015)
21	<i>Sclerodoris tuberculata</i> Eliot, 1904	Gulf of Kachchh (Apte et al. 2010; GEER 2014a,b; Apte & Desai 2017); Pirotan Island, Goose Island, Kalubhar Island, Ashaba Island (Parasharya 2012); Narara Reef (Parasharya 2012; Bhave et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Poshitra Reef, Dwarka (Bhave et al. 2015); present study
22	<i>Otinodoris raripilosa</i> (Abraham, 1877)	Pirotan Island (Narayanan 1969); Gujarat (Venkataraman et al. 2015)
23	<i>Taringa sublutea</i> (Abraham, 1877)	Dwarka (Prasade et al. 2015; Apte & Desai 2017); Gujarat (Raghunathan et al. 2016); Gulf of Kachchh, Okha (Apte & Desai 2017); present study
24	<i>Sebadoris nubilosa</i> (Pease, 1871)	Porbandar (Rao & Rao 1980)
25	<i>Tayuva lilacina</i> (Gould, 1852)	Gulf of Kachchh (Apte et al. 2010; GEER 2014a,b; Apte & Desai 2017); Pirotan Island, Goose Island, Kalubhar Island (Parasharya 2012); Poshitra Reef (Parasharya 2012; Bhave et al. 2015); Narara Reef (Bhave et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study

	Species	References
Family: Polyceridae Alder & Hancock, 1845		
26	<i>Plocamopherus ocellatus</i> Rüppell & Leuckart, 1828	Okha (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
27	<i>Plocamopherus ceylonicus</i> (Kelaart, 1858)	Kyu Island-Okha Mandal (Eliot 1909); Okha (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010); Poshitra Reef (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai, 2017); present study
28	<i>Thecacera pennigera</i> (Montagu, 1813)	Gujarat (Apte & Desai 2017)
29	<i>Gymnodoris alba</i> (Bergh, 1877)	Gulf of Kachchh (Apte et al. 2010); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
30	<i>Gymnodoris citrina</i> (Bergh, 1877)	Gujarat (Apte & Desai 2017)
Family: Chromodorididae Bergh, 1891		
31	<i>Glossodoris pallida</i> (Rüppell & Leuckart, 1830)	Gulf of Kachchh, Dwarka, Okha (Apte & Desai 2017)
32	<i>Hypselodoris infucata</i> (Rüppell & Leuckart, 1830)	Pirotan Island (Narayanan 1969; Parasharya 2012); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010; GEER, 2013, 2014a,b); Goose Island, Kalubhar Island (Parasharya, 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017); Present study
33	<i>Hypselodoris carnea</i> (Bergh, 1889)	Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Gulf of Kachchh, Dwarka, Okha (Apte & Desai 2017)
34	<i>Hypselodoris sagamiensis</i> (Baba, 1949)	Narara Reef, Kalubhar Island (Parasharya 2012); Gulf of Kachchh (GEER, 2013, 2014a,b)
35	<i>Goniobranchus tinctorius</i> (Rüppell & Leuckart, 1830)	Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
36	<i>Goniobranchus petechialis</i> (Gould, 1852)	Kathiawar (Eliot 1909)
37	<i>Goniobranchus fidelis</i> (Kelaart, 1858)	Sikka, Pirotan Island (Rudman 1973); Gulf of Kachchh (Apte & Desai 2017); present study
38	<i>Goniobranchus bombayanus</i> (Winckworth, 1946)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
39	<i>Mexichromis mariei</i> (Crosse, 1872)	Roji Island (Rudman 1973); Adatra (Rudman 1983); Gulf of Kachchh (Apte & Desai 2017); present study
Family: Goniodorididae H. Adams & A. Adams, 1854		
40	<i>Goniodoris joubini</i> Risbec, 1928	Gulf of Kachchh, Dwarka (Apte & Desai 2017)
Family: Phyllidiidae Rafinesque, 1814		
41	<i>Phyllidiella zeylanica</i> (Kelaart, 1859)	Pirotan Island (Narayanan 1969; Burn 1970); Gulf of Kachchh (Rao & Sastry 2005); Mithapur Reef (Matwal & Joshi 2011); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Gulf of Kachchh (Apte & Desai 2017); present study
Family: Dendrodorididae O'Donoghue, 1924 (1864)		
42	<i>Dendrodoris fumata</i> (Rüppell & Leuckart, 1830)	Gulf of Kachchh (Apte et al. 2010); Goose Island, Narara Reef (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017); present study
43	<i>Dendrodoris nigra</i> (Stimpson, 1855)	Pirotan Island (Menon et al. 1961); Kyu Island-Okha Mandal (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005; Apte & Desai 2017); Dwarka (Poriya et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
44	<i>Dendrodoris atromaculata</i> (Alder & Hancock, 1864)	Present study
45	<i>Doriopsilla miniata</i> (Alder & Hancock, 1864)	Dona Reef, Okha (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010; GEER 2014a,b; Apte & Desai 2017); Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
Family: Bornellidae Bergh, 1874		
46	<i>Bornella stellifera</i> (A. Adams & Reeve [in A. Adams], 1848)	Chandri Reef (Eliot 1909); Pirotan Island (Menon et al. 1961; Parasharya 2012); Okha (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010; GEER 2013, 2014a,b); Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017); present study
Family: Embletoniidae Pruvot-Fol, 1954		
47	<i>Embletonia gracilis</i> Risbec, 1928	Gulf of Kachchh (Apte & Desai 2017)
Family: Arminidae Iredale & O'Donoghue, 1923 (1841)		
48	<i>Armina cinerea</i> (Farran, 1905)	Pirotan Island (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
49	<i>Dermatobranchus fortunatus</i> (Bergh, 1888)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Pirotan Island, Narara Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
50	<i>Dermatobranchus semistriatus</i> Baba, 1949	Okha, Kyu Island-Okha Mandal (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
Family: Janolidae Pruvot-Fol, 1933		
51	<i>Janolus toyamensis</i> Baba & Abe, 1970	Kyu Island-Okha Mandal (Eliot 1909); Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Gulf of Kachchh (Apte & Desai 2017); present study

	Species	References
Family: Tethydidae Rafinesque, 1815		
52	<i>Melibe viridis</i> (Kelaart, 1858)	Kyu Island-Okha Mandal (Eliot 1909; Hornell 1909); Gulf of Kachchh (Rao & Sastry 2005; Apte & Desai 2017); Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); Dwarka, Okha (Apte & Desai 2017); present study
Family: Samlidae Korshunova, Martynov, Bakken, Evertsen, Fletcher, Mudianta, Saito, Lundin, Schrödl & Picton, 2017		
53	<i>Samla bicolor</i> (Kelaart, 1858)	Gulf of Kachchh (Apte et al. 2010; Poriya et al. 2015); Poshitra Reef, Ashaba Island (Parasharya 2012); Mangrol, Veraval, Diu (Poriya et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
Family: Eubranchidae Odhner, 1934		
54	<i>Eubranchus virginalis</i> (Baba, 1949)	Gulf of Kachchh (Apte & Desai 2017)
Family: Lomanotidae Bergh, 1890		
55	<i>Lomanotus vermiformis</i> Eliot, 1908	Poshitra Reef, Ashaba Island (Parasharya 2012); Gulf of Kachchh (Apte & Desai 2017)
Family: Trinchesiidae F. Nordsieck, 1972		
56	<i>Phestilla lugubris</i> (Bergh, 1870)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Pirotan Island, Goose Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
57	<i>Phestilla minor</i> Rudman, 1981	Gulf of Kachchh (Apte & Desai 2017)
58	<i>Trinchesia yamasui</i> (Hamatani, 1993)	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
Family: Aeolidiidae Gray, 1827		
59	<i>Baeolidia salaamica</i> (Rudman, 1982)	Gujarat (Apte & Desai 2017)
60	<i>Baeolidia palythoae</i> Gosliner, 1985	Mangrol, Veraval, Diu (Poriya et al. 2015); Gujarat (Apte & Desai 2017)
61	<i>Anteaeolidiella cacaotica</i> (Stimpson, 1855)	Poshitra Reef (Parasharya 2012)
62	<i>Anteaeolidiella poshitra</i> Carmona, Bhave, Salunkhe, Pola, Gosliner & Cervera, 2014	Poshitra Reef (Carmona et al. 2014; Apte & Desai 2017); Gujarat (Raghunathan et al. 2016); present study
Family: Facelinidae Bergh, 1889		
63	<i>Phidiana militaris</i> (Alder & Hancock, 1864)	Dona Reef (Narayanan 1969; Burn & Narayanan 1970); Adatra, Okha (Rudman 1980); Gulf of Kachchh (Subba Rao & Sastry 2005; Apte et al. 2010; Poriya et al. 2015); Poshitra Reef, Ashaba Island (Parasharya 2012); Mangrol, Veraval, Diu (Poriya et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017); present study
64	<i>Facelina lineata</i> Eliot, 1905	Gulf of Kachchh (Apte & Desai 2017)
65	<i>Cratena lineata</i> (Eliot, 1905)	Ashaba Island (Parasharya 2012); Gulf of Kachchh (Apte & Desai 2017)
66	<i>Cratena poshitraensis</i> Bharate, Padula, Apte & Shimpi, 2020	Poshitra Reef (Bharate et al. 2020); present study
67	<i>Pteraeolidia ianthina</i> (Angas, 1864)	Gulf of Kachchh (Apte et al. 2010; GEER 2014a,b); Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
68	<i>Pteraeolidia semperi</i> (Bergh, 1870)	Kyu Island-Okha Mandal (Eliot 1909); Gulf of Kachchh, Dwarka, Okha (Apte & Desai 2017); present study
69	<i>Noumeaella isa</i> Ev. Marcus & Er. Marcus, 1970	Gulf of Kachchh (Apte & Desai 2017)
70	<i>Sakuraeolis gujaratica</i> Rudman, 1980	Adatra, Okha (Rudman 1980); Gulf of Kachchh (Apte et al. 2010; GEER 2014a,b; Poriya et al. 2015; Apte & Desai 2017); Poshitra Reef, Ashaba Island (Parasharya 2012); Diu (Poriya et al. 2015); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
Family: Facelinidae Bergh, 1889 (=Myrrhinidae Bergh, 1905)		
71	<i>Phyllodesmium serratum</i> (Baba, 1949)	Gulf of Kachchh, Dwarka, Okha (Apte & Desai 2017)
Family: Bullidae Gray, 1827		
72	<i>Bulla ampulla</i> Linnaeus, 1758	Gulf of Kachchh (Gideon et al. 1957); Bet Dwarka (Menon et al. 1961); Pirotan Island (Menon et al. 1961; Surya Rao et al. 2004); Sikka, Mithapur Reef (Rao et al. 2004); Gulf of Kachchh (Rao & Sastry 2005; Apte et al. 2010; GEER 2013, 2014a,b); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
Family: Haminoeidae Pilsbry, 1895		
73	<i>Haminoea tenera</i> (A. Adams, 1850)	Bet Dwarka, Pirotan Island (Menon et al. 1961); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
74	<i>Smaragdinella calyculata</i> (Broderip & G. B. Sowerby I, 1829)	Okha (Apte & Desai 2017)
75	<i>Haloa natalensis</i> (Krauss, 1848)	Gulf of Kachchh (Rao & Sastry 2005); Poshitra Reef, Ashaba Island (Parasharya 2012)
76	<i>Lamprohaminoea ovalis</i> (Pease, 1868)	Gulf of Kachchh (Apte et al. 2010; Poriya et al. 2015; Apte & Desai 2017); Mangrol (Poriya et al. 2015); Porbandar (Apte & Desai 2017); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)

	Species	References
Family: Aglajidae Pilsbry, 1895 (1847)		
77	<i>Phillinopsis speciosa</i> Pease, 1860	Gulf of Kachchh (Apte & Desai 2017); Present study
Family: Aplysiidae Lamarck, 1809		
78	<i>Aplysia argus</i> Rüppell & Leuckart, 1830	Bet Dwarka, Pirotan Island, Sikka (Narayanan 1969); Gulf of Kachchh (Rao 2003; Rao & Sastry 2005; Apte et al. 2010; GEER 2013, 2014a); Dwarka (Raghunathan et al. 2004); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
79	<i>Aplysia oculifera</i> A. Adams & Reeve, 1850	Gulf of Kutch (GEER 2014b; Poriya et al. 2015); Dwarka, Mangrol, Veraval, Kodinar, Diu (Poriya et al. 2015); Kalubhar Island, Ashaba Island (Parasharya 2012); present study
80	<i>Aplysia parvula</i> Mörch, 1863	Veraval, Diu, Mahuva (Raghunathan et al. 2004); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
81	<i>Aplysia cornigera</i> G. B. Sowerby I, 1869	Gujarat (Rao 2003; Venkataraman et al. 2015; Raghunathan et al. 2016)
82	<i>Aplysia rudmani</i> Bebbington, 1974	Gulf of Kachchh (Rao & Sastry 2005)
83	<i>Stylocheilus striatus</i> (Quoy & Gaimard, 1832)	Okha (Apte 2013); Gujarat (Apte & Desai 2017)
Family: Oxynoidae Stoliczka, 1868 (1847)		
84	<i>Oxynoe viridis</i> (Pease, 1861)	Gulf of Kachchh (Apte & Desai 2017)
85	<i>Lobiger viridis</i> Pease, 1863	Poshitra Reef, Ashaba Island (Parasharya 2012); Gulf of Kachchh (Apte & Desai 2017)
Family: Plakobranichidae Gray, 1840		
86	<i>Elysia ornata</i> (Swainson, 1840)	Pirotan Island, Goose Island, Kalubhar Island, Poshitra Reef, Ashaba Island (Parasharya 2012); Gulf of Kachchh (GEER 2013, 2014a,b); Gujarat (Apte & Desai 2017); present study
87	<i>Elysia grandifolia</i> Kelaart, 1858	Kyu Island-Okha Mandal (Eliot 1909); Bet Dwarka, Poshitra Reef (Narayanan 1969); Gulf of Kachchh (Rao & Sastry 2005); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
88	<i>Elysia pusilla</i> (Bergh, 1871)	Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)
89	<i>Elysia expansa</i> (O'Donoghue, 1924)	Gujarat (Apte & Desai 2017); present study
90	<i>Elysia obtusa</i> Baba, 1938	Gulf of Kachchh (Apte et al. 2010; GEER 2014b); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016)
91	<i>Elysia hirasei</i> Baba, 1955	Gujarat (Apte & Desai 2017)
92	<i>Elysia thompsoni</i> Jensen, 1993	Gulf of Kachchh (Apte et al. 2010; Apte & Desai 2017); Goose Island, Kalubhar Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016); present study
93	<i>Elysia tomentosa</i> K. Jensen, 1997	Gulf of Kachchh (Apte et al. 2010; GEER 2014a,b); Pirotan Island, Goose Island, Narara Reef, Kalubhar Island, Poshitra Reef, Ashaba Island (Parasharya 2012); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017); present study
94	<i>Plakobranichus ocellatus</i> van Hasselt, 1824	Gulf of Kachchh (Apte & Desai 2017)
Family: Limapontiidae Gray, 1847		
95	<i>Sacoproteus smaragdinus</i> (Baba, 1949)	Poshitra Reef (Apte et al. 2015); Gulf of Kachchh (Apte & Desai 2017)

which possesses rocky intertidal zones with few patches of corals and mangroves. No sea slugs were reported in the Gulf of Khambhat.

Of the species identified, the largest number belong to the family Discodorididae (17 species, 12 genera), followed by Chromodorididae (nine species, four genera), Plakobranichidae (nine species, two genera), Facelinidae (eight species, six genera), Aplysiidae (six species, two genera), Polyceridae (five species, three genera), Haminoeidae (four species, four genera), Aeolidiidae (four species, two genera), Dendrodorididae (four species, two genera), Arminidae (three species, two genera), Pleurobranchidae (three species, two genera), Trinchysiidae (three species, two genera), Dorididae (two species, two genera), Oxynoidae (two species, two genera), Aplustridae (two species, one genus). One species each was identified from Aglajidae, Bornellidae,

Bullidae, Embletoniidae, Eubranichidae, Goniodorididae, Janolidae, Limapontiidae, Lomanotidae, Facelinidae (=Myrrhinidae), Pleurobranchaeidae, Phyllidiidae, Samlidae, and Tethydidae.

Present status and threats to sea slugs fauna

Anthropogenic activities, habitat loss, and invasive species are major threats to the biodiversity and sustainability of ecosystems (Imtiyaz et al. 2012). Sea slugs are not targeted for fishing or other human activities, but they are endangered by trawling, industrial discharge, habitat destruction, oil spills (the Gulf of Kachchh contains several large ports including Kandla, Vadinar, Mundra, Mandvi, Mithapur, Bedi, and Sikka), and climate change. The construction of jetties 3–4 km into the sea leads to increased siltation that alters shoreline topography and threatens coral communities.

Table 2. Synonyms of accepted sea slugs fauna recorded from Gujarat coast.

	Current Name	Synonymised Name
1	<i>Hydatina zonata</i> (Lightfoot, 1786)	<i>Hydatina velum</i> (Gmelin, 1791)
2	<i>Doriopsis granulosa</i> Pease, 1860	<i>Doris granulosa</i> (Pease, 1860)
3	<i>Jorunna funebris</i> (Kelaart, 1859)	<i>Kentrodoris funebris</i> (Kelaart, 1859)
4	<i>Carminodoris grandiflora</i> (Pease, 1860)	<i>Hoplodoris grandiflora</i> (Pease, 1860)
5	<i>Otinodoris raripilosa</i> (Abraham, 1877)	<i>Asteronotus raripilosus</i> (Abraham, 1877); <i>Hoplodoris desmoparypha</i> Bergh, 1880
6	<i>Taringa sublutea</i> (Abraham, 1877)	<i>Taringa caudata</i> (Farran, 1905)
7	<i>Sebadoris nubilosa</i> (Pease, 1871)	<i>Thordisa crosslandi</i> Eliot, 1904
8	<i>Goniobranchus tinctorius</i> (Rüppell & Leuckart, 1830)	<i>Chromodoris tinctoria</i> (Rüppell & Leuckart, 1830)
9	<i>Goniobranchus petechialis</i> (Gould, 1852)	<i>Chromodoris petechialis</i> (Gould, 1852)
10	<i>Goniobranchus fidelis</i> (Kelaart, 1858)	<i>Chromodoris krishna</i> Rudman, 1973
11	<i>Goniobranchus bombayanus</i> (Winckworth, 1946)	<i>Chromodoris bombayana</i> (Winkworth, 1946)
12	<i>Mexichromis mariei</i> (Crosse, 1872)	<i>Chromodoris mariei</i> (Crosse, 1872)
13	<i>Phyllidiella zeylanica</i> (Kelaart, 1859)	<i>Phyllidia zeylanica</i> Kelaart, 1859
14	<i>Bornella stellifera</i> (A. Adams & Reeve [in A. Adams], 1848)	<i>Bornella digitata</i> A. Adams & Reeve, 1850
15	<i>Armina cinerea</i> (Farran, 1905)	<i>Linguella cinerea</i> Farran, 1905
16	<i>Janolus toyamensis</i> Baba & Abe, 1970	<i>Antiopella indica</i> (Eliot, 1909); <i>Janolus indica</i> (Eliot, 1909)
17	<i>Melibe viridis</i> (Kelaart, 1858)	<i>Melibe rangi</i> Bergh, 1875
18	<i>Samla bicolor</i> (Kelaart, 1858)	<i>Flabellina bicolor</i> (Kelaart, 1858)
19	<i>Phestilla lugubris</i> (Bergh, 1870)	<i>Tenellia lugubris</i> (Bergh, 1870)
20	<i>Phestilla minor</i> Rudman, 1981	<i>Tenellia minor</i> (Rudman, 1981)
21	<i>Trinchesia yamasui</i> (Hamatani, 1993)	<i>Cuthona yamasui</i> Hamatani, 1993
22	<i>Anteaeolidiella cacaotica</i> (Stimpson, 1855)	<i>Anteaeolidiella foulisi</i> (Angas, 1864)
23	<i>Phidiana militaris</i> (Alder & Hancock, 1864)	<i>Hervia militaris</i> (Alder & Hancock, 1864); <i>Eolis militaris</i> Alder & Hancock, 1864
24	<i>Haloo natalensis</i> (Krauss, 1848)	<i>Haminoea natalensis</i> (Krauss, 1848)
25	<i>Lamprohaminoea ovalis</i> (Pease, 1868)	<i>Haminoea ovalis</i> Pease, 1868
26	<i>Aplysia argus</i> Rüppell & Leuckart, 1830	<i>Aplysia benedicti</i> Eliot, 1899
27	<i>Sacoproteus smaragdinus</i> (Baba, 1949)	<i>Stiliger smaragdinus</i> Baba, 1949

Industrial pollution may also have adverse effects on the water quality of the Gulf of Kachchh, Gulf of Khambhat, and Saurashtra coastline which may directly affect marine fauna. Information concerning the population status and ecology of sea slugs is lacking, but they are known to be sensitive to changes in habitats. Goddard et al. (2018) observed benthic sea slugs found outside of their normal ranges due to the effect of the 2015–16 El Nino. They observed a northern range shift for 52 species (1/4 of the recorded species from the region), and a positive correlation between total nudibranch abundance and El Nino events, sea surface temperature, sea surface height and warm phase of Pacific decadal oscillation, whereas they observed negative correlation with La Nina event.

CONCLUSION

Advance technologies bring the changes in sea slug faunal classifications, as a result, major revision took place in families, genera and species. DNA barcoding technology and taxonomy as radula morphology solved many species complexes and clarified the species identity of sea slug fauna. The species diversity sea slugs are recorded during the survey were mainly observed from intertidal region by direct observation. The snorkelling and scuba diving in the region can add more species from this area. The higher diversity of sea slugs in Gulf of Kachchh water than other areas in Gujarat due to diversified ecosystems exist such as coral reef, mangrove vegetation, sea grass, muddy sandy and rocky shore etc. Sikka coast is unique in terms of

Table 3. Checklist of misidentified sea slugs of Gujarat coast.

	Species	References	Comment	Distribution
1	<i>Aplysia dactylomela</i> Rang, 1828	Dwarka (Raghunathan et al. 2004); Gulf of Kachchh (Apte et al. 2010; GEER 2014b); Gujarat (Venkataraman et al. 2015; Raghunathan et al. 2016; Apte & Desai 2017)	<i>Aplysia dactylomela</i> Rang, 1828 misidentified from India. True identity is given as <i>Aplysia argus</i> rüppell & leuckart, 1830 (Mollusca: Opisthobranchia: Aplysiidae) from Lakshadweep, with notes on its taxonomy in India (Chandran et al. 2016)	Red Sea (Eales 1960; Bebbington 1974, 1977); Greece (Zenetos et al. 2005); (Çinar 2006; Yokes 2008; Ayas & Ağilkaya 2017); Mediterranean Sea (Schembri 2008; Valdés et al. 2013); Turkey Israel (Pasternak & Galil 2010)
2	<i>Aplysia fasciata</i> Poiret, 1789	Gujarat (GSBTM, 2015; Raghunathan et al. 2016)	No occurrence in India	Florida (Heilprin 1887; Golestani et al. 2019); Egypt (Eales 1960); Israel (Susswein et al. 1987; Golestani et al. 2019); Massachusetts to Brazil (Rosenberg et al. 2009); Brazil (Golestani et al. 2019)
3	<i>Stylocheilus longicauda</i> (Quoy & Gaimard, 1825)	Okha (Apte 2013)	Species is actually <i>Stylocheilus striatus</i> (Quoy & Gaimard 1832)	Andaman & Nicobar Islands (Ramakrishna et al. 2010; Apte & Desai 2017); southwestern coast of India (Chinnadurai et al. 2014)
4	<i>Philinopsis taronga</i> (Allan, 1933)	Ashaba Island (Parasharya 2012)	No occurrence in India	Australia (Allan 1933; Burn 2006; Zamora-Silva & Malaquias 2018); New Zealand (Rudman 1972; Morley & Hayward 2015)
5	<i>Haminoea alfredensis</i> (Bartsch, 1915)	Gujarat (Raghunathan et al. 2016)	No occurrence in India	South Africa (Bartsch 1915; Macnae 1962; Gosliner 1987; Oskars et al. 2019); Oceania (Oskars et al. 2019)
6	<i>Haminoea elegans</i> Gray, 1825)	Sikka, Bhadreshwar, Salaya, Pirotan Island, Porbandar (Rao et al. 2004)	No occurrence in India	Brazil (Marcus 1957); Jamaica (Thompson 1977); Central Africa, Congo, Cuba, Florida, Mexico (Martinez & Ortea 1997); Bermuda to Brazil; E. Atlantic (Rosenberg et al. 2009)
7	<i>Haminoea galba</i> Pease, 1861	Pirotan Island (Gideon et al. 1957)	No occurrence in India	Hawaii (Kay 1979)
8	<i>Haminoea hydatis</i> (Linnaeus, 1758)	Gulf of Kachchh (Rao & Sastry 2005)	True identity is <i>Haminoea natalensis</i> (Krauss, 1848)	Mediterranean Sea (Linnaeus 1758); United Kingdom (Leach 1852); Portugal (Adams 1869); Italy (Alvarez et al. 1993, Castriota et al. 2005); France (Oskars & Malaquias 2019)
9	<i>Retusophilina lima</i> (T. Brown, 1827)	Gulf of Kachchh (GEER 2014b)	No occurrence in India	Massachusetts (Couthouy 1838); Scotland (Brown 1827; Ohnheiser & Malaquias 2013); Norway (Ohnheiser & Malaquias 2013); United Kingdom (Ohnheiser & Malaquias 2013)
10	<i>Hypselodoris capensis</i> (Barnard, 1927)	Mithapur Reef	True identity is <i>Hypselodoris carnea</i> (Bergh, 1889)	South Africa (Barnard 1927; Gosliner 1987; McPhail et al. 1998; Gosliner & Johnson 1999; Johnson & Gosliner 2012)
11	<i>Atagema alba</i> (O'Donoghue, 1927)	Narara Reef, Kalubhar Island (Parasharya 2012)	No occurrence in India	California (O'Donoghue 1927; MacFarland 1966; Bertsch & Gosliner 1986); Mexico (Bertsch & Gosliner 1986)
12	<i>Carminodoris bifurcata</i> Baba, 1993	Poshitra Reef, Ashaba Island (Parasharya 2012)	No occurrence in India	Hawaii (Kay & Young 1969; Fahey & Gosliner 2003); Japan (Baba 1993); Okinawa Island, Philippines (Fahey & Gosliner 2003)
13	<i>Cratena capensis</i> Barnard, 1927	Poshitra Reef (Parasharya 2012)	Endemic to South Africa, No occurrence in India	South Africa (Barnard 1927; Macnae 1954; Gosliner 1987)
14	<i>Cratena peregrina</i> (Gmelin, 1791)	Poshitra Reef, Ashaba Island (Parasharya 2012)	No occurrence in India	Italy (Martin 2003; Willis et al. 2017); Croatia, Crveni Otok, France, Spain, Andalucia (Padula et al. 2014)
15	<i>Knoutsodonta brasiliensis</i> (Alvim, Padula & Pimenta, 2011)	Gulf of Kachchh (Apte & Desai 2017)	No occurrence in India	Brazil (Alvim et al. 2011)
16	<i>Oxynoe panamensis</i> Pilsbry & Olsson, 1943	Poshitra Reef, Ashaba Island (Parasharya 2012)	No occurrence in India	Panama (Pilsbry & Olsson 1943); California, Mexico (Lewin 1970)

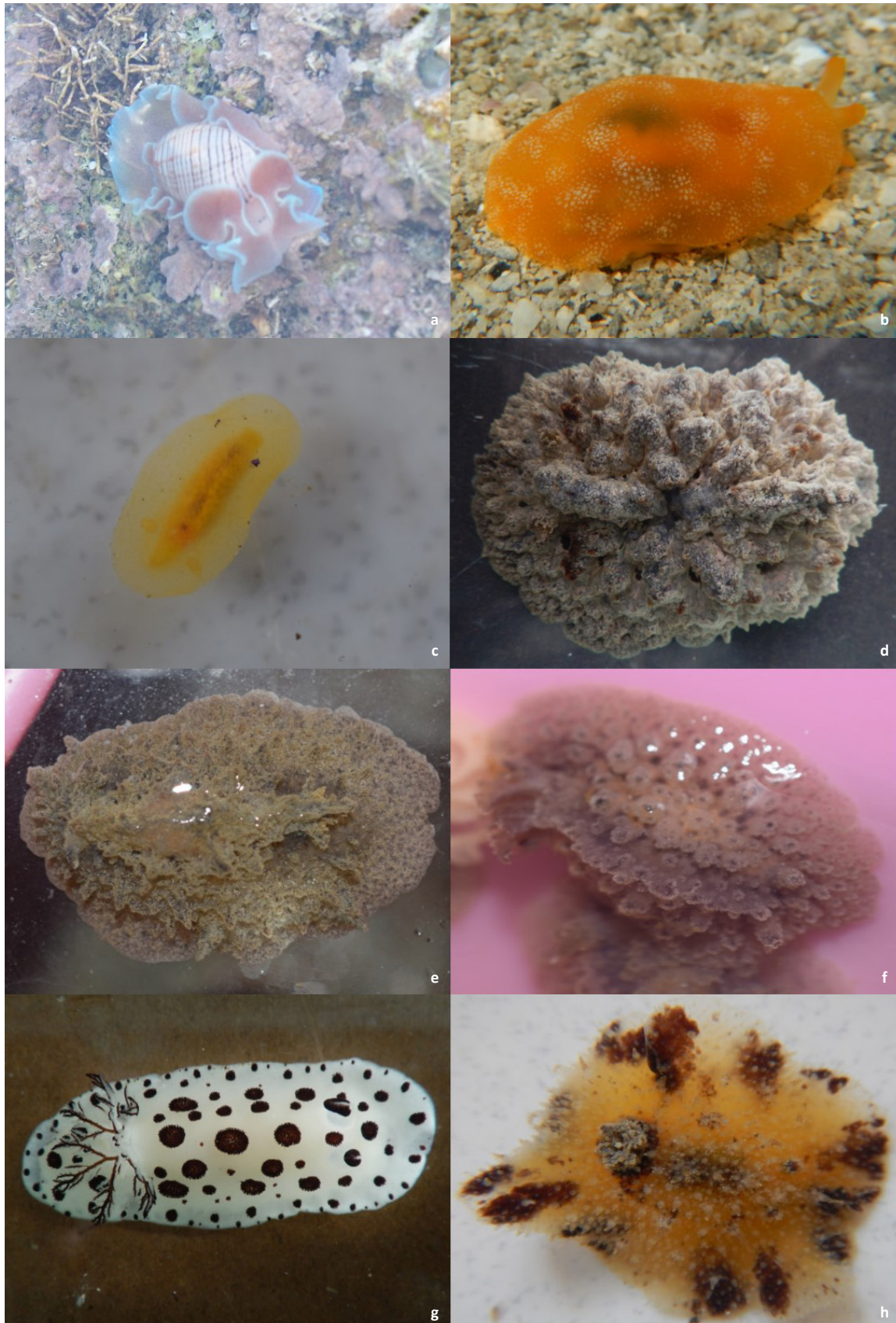


Image 1. a—*Hydatina physis* | b—*Berthellina citrina* | c—*Doriopsis granulosa* | d—*Atagema spongiosa* | e—*Atagema tristis* | f—*Atagema rugosa* | g—*Jorunna funebris* | h—*Thordisa villosa*. © Fisheries Research Station, Junagadh Agricultural University.



Image 2. a—*Peltodoris murrea* | b—*Sclerodoris tuberculata* | c—*Taringa sublutea* | d—*Tayuva lilacina* | e—*Plocamopherus ceylonicus* | f—*Hypselodoris infucata* | g—*Goniobranchus fidelis* | h—*Goniobranchus bombayanus*. © Fisheries Research Station, Junagadh Agricultural University.

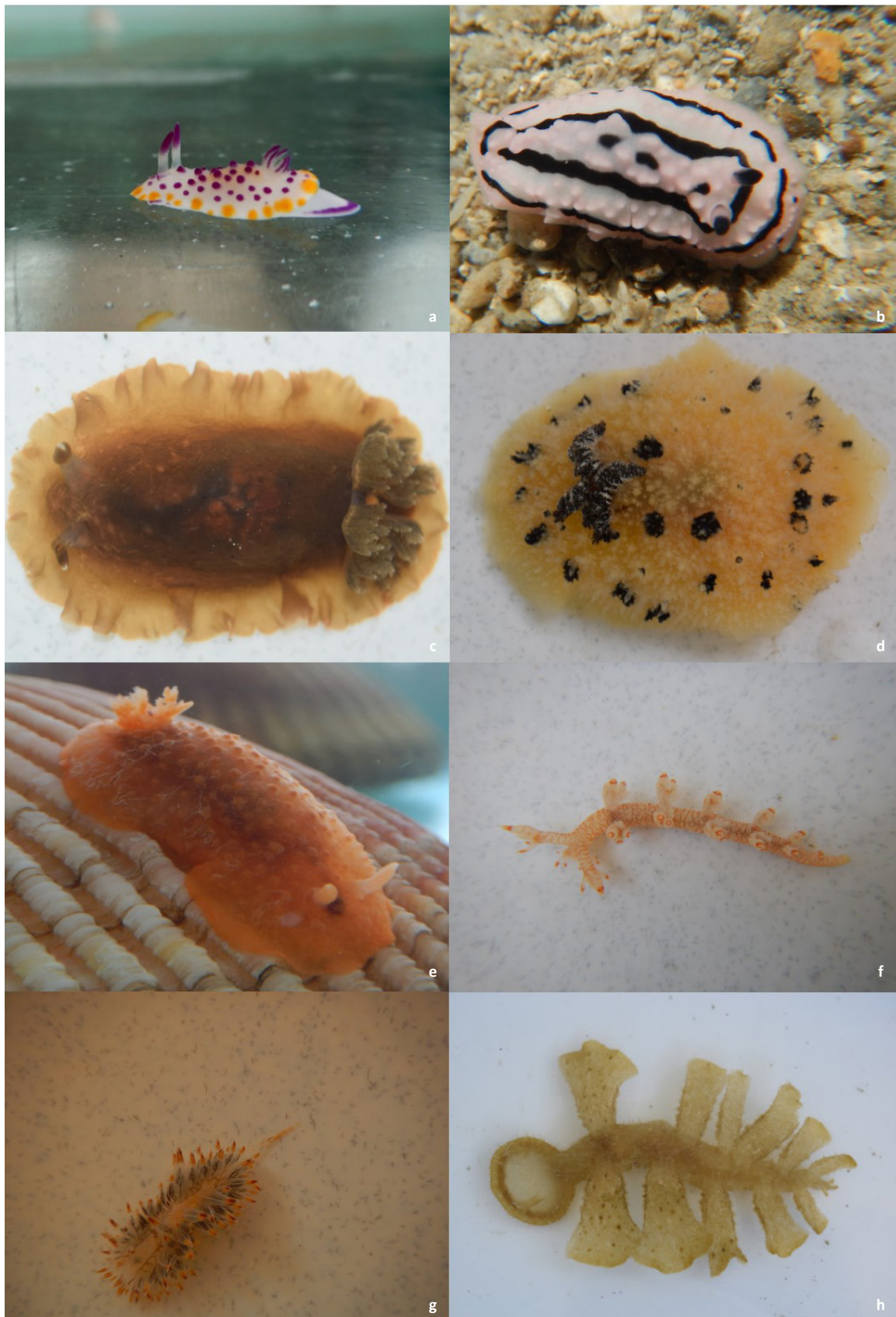


Image 3. a—*Mexichromis mariei* | b—*Phyllidiella zeylanica* | c—*Dendrodoris fumata* | d—*Dendrodoris atromaculata* | e—*Doriopsilla miniata* | f—*Bornella stellifera* | g—*Janolus toyamensis* | h—*Melibe viridis*. © Fisheries Research Station, Junagadh Agricultural University.



Image 4. a—*Phestilla lugubris* | b—*Trinchesia yamasui* | c—*Antaeolidiella poshitra* | d—*Phidiana militaris* | e—*Cratena poshitraensis* | f—*Pteraeolidia semperi* | g—*Sakuraeolis gujaratica* | h—*Philinopsis speciosa*. © Fisheries Research Station, Junagadh Agricultural University.



Image 5. a—*Aplysia oculifera* | b—*Elysia ornata* | c—*Elysia expansa* | d—*Elysia thompsoni* | e—*Elysia tomentosa*. © Fisheries Research Station, Junagadh Agricultural University.

diversity of marine macrofauna and flora. This unique habitat should be conserved for future and further study can be done by exploring more hidden areas of coast. Local people, fishermen, researchers can be aware of this beautiful fauna's important in marine ecosystem through conducting a good awareness and education programs.

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