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Annotated Faunal List of Cheilostome Ectoprocta of Washington State

Abstract

Forty species (18 anascans and 22 ascophorans) of cheilostome ectoprocta are recorded from a variety of habitats, primarily estuarine and intertidal, and substrates. Two types of ectoproct species associations are distinguishable on submerged tires and apparently in part are related to salinity. The brackish water association consists of extensive colonies of a few species of membraniporids. The other association is found where salinity approaches normal marine conditions and consists of greater numbers of cheilostome species of which *Bugula pacifica* and *Schizoporella unicornis* predominate.

A number of early studies of the ectoprocta fauna of the Pacific Northwest were made and the species records for Washington State are scattered through a series of publications. Hincks (1882, 1883, 1884) reported on the ectoproct fauna of the Queen Charlotte Islands and O'Donoghue and O'Donoghue (1923, 1925, 1926) studied ectoprocta from Vancouver Island and Puget Sound. Knox (1938) in an incomplete, unpublished, and unillustrated dissertation examined a large number of ectoprocta in Puget Sound and adjacent regions. However, because his illustrations and collections have been lost, use of this report to establish the species that he recorded is not possible.

In regional surveys, Robertson (1900, 1905, 1908, 1910) identified the ectoproct fauna of the Pacific Coast of North America and included some records from Washington State. Osburn (1950, 1952, 1953) identified ectoprocta collected by the Allan Hancock Pacific Expedition (1933-1942) and some material from Pacific Northwest collections. Several ectoproct species, considered by J. D. Soule (1959, 1961, 1963) and Soule and Soule (1964) in reports on Baja California, and Pinter (1969), in a study of ectoproct-algal relationships in southern California, are found as far north as Washington State. Recently Ross (1970) published a key to the cyclostome ectoprocta of northwest Washington State and Powell (1970) reported the occurrence of several species of ectoprocta in the Strait of Georgia, including stations in Washington.

This species list is based on collections of cheilostomes accumulated between December, 1969, and March, 1972, in connection with a study of *Schizoporella unicornis* (Johnston). The list is comprehensive for only certain sites, the majority of which are marinas located in estuarine areas (Fig. 1).

Associations at "Dock" Stations

The greatest number of stations are docks and marinas ("dock" stations) where material was scraped from partially submerged tires and styrofoam suspended from floats. These stations are located in estuarine areas of variable salinity. The salinity may vary from normal marine (Station 29, entrance to Willapa Bay) to extreme brackish

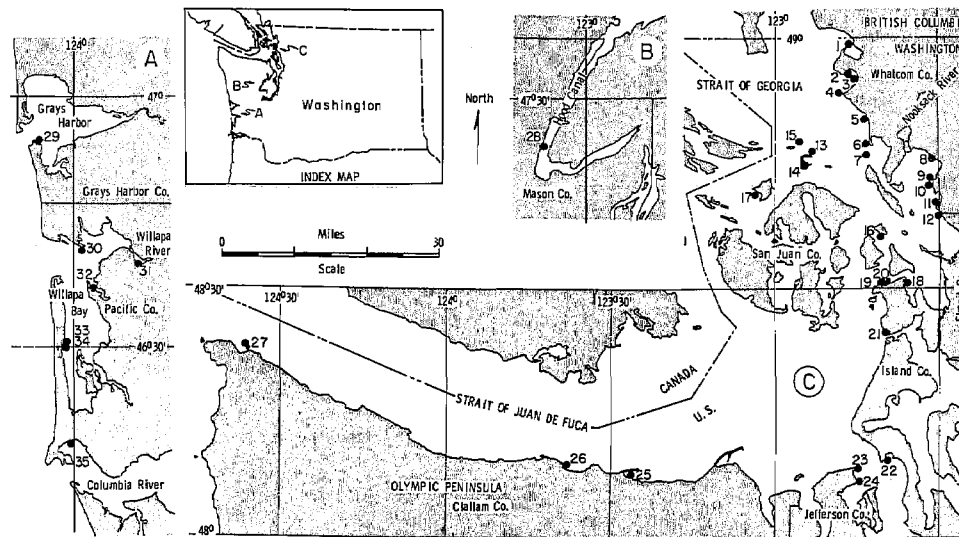
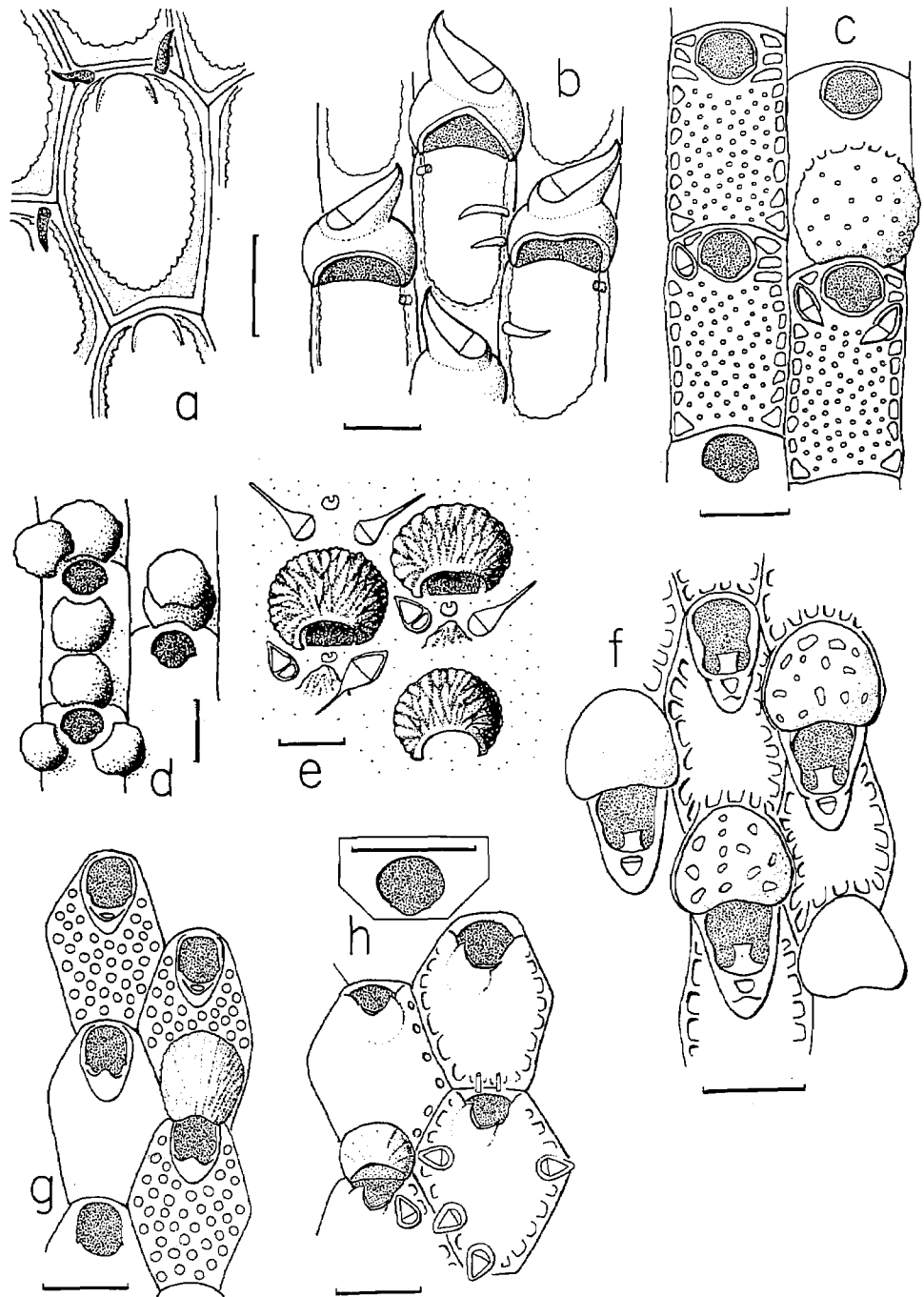


Figure 1. Collecting stations in Whatcom, San Juan, Skagit, Grays Harbor, Pacific, Island, Jefferson, Mason and Clallam Counties. Station type and collector if other than authors are given for each station. (D)—"Dock" station; (I)—Intertidal stations; (S)—Subtidal stations or material with a subtidal source. WHATCOM COUNTY—1. Blaine marina, Blaine (D); 2. Birch Bay Development marina (D); 3. Rocky area N. of Birch Bay marina (I), D. Schneider; 4. Point Whitehorn (SCUBA, J. Fralick), no station type given; 5. Cherry Point (I), K. Vandenheuvel in part; 6. Sandy Point marina (D); 7. Sandy Point (Dredging, 100 ft; R. Haard); 8. Squalicum marina, Bellingham (D); 9. Post Point, Bellingham (I); 10. Edgemoor Pond (S), L. Sundquist in part; 11. Pleasant Bay (D), G. Garlick in part; 12. Larrabee State Park (I), C. Begert in part. SAN JUAN COUNTY—13. Clement's Reef (SCUBA, N. Kjargaard), no station type given; 14. Little Sucia Reef (I); 15. Patos I., N. side (I); 16. Sinclair I., SW side (Dredging, 60 ft; D. Starr); 17. Waldron I. (SCUBA, G. Moore), no station type given. SKAGIT COUNTY—18. Anacortes Yacht Club, Anacortes (D); 19. Shannon Point, W. of ferry terminal (I); 20. Shannon Point, piling on beach (S); 21. Rosario Beach, Deception Pass St. Park (I). ISLAND COUNTY—22. Ft. Casey State Park (SCUBA, M. Dube). JEFFERSON COUNTY—23. Point Hudson marina, Port Townsend (D); 24. Port Townsend marina, Port Townsend (D). CLALLAM COUNTY—25. Port Angeles marina, Port Angeles (D); 26. Freshwater Bay (I); 27. Waadah Island, Neah Bay (I). MASON COUNTY—28. Hoodspout marina, Hoodspout (D). GRAYS HARBOR COUNTY—29. Westport marina, Westport (D). PACIFIC COUNTY—30. Tokeland marina, Tokeland (D); 31. South Bend, small dock (D); 32. Bay Center, small dock (D); 33. Nahcotta marina, Nahcotta (D); 34. Nahcotta, oyster shell piles (S); 35. Ilwaco marina, Ilwaco (D).

Figure 2. Bar scale 0.2 mm. Figure 2a. *Membranipora serrilamella* Osburn. Station 35. Figure 2b. *Tegella aquilirostris* (O'Donoghue and O'Donoghue). Station 20. Ectoecial ridge of ovicell varies in outline and distal spines are hollow. Figure 2c, 2d. *Schizoporella micornis* (Johnston). Station 28. 2d, Diagram shows possible placements of secondary ovicells which may occur in any combination. Figure 2e. *Microporella* sp. A. Station 26. Figure 2f. *Smittoidea prolifica* Osburn. Station 30. Figure 2g. *Muronella? perforata* Okada and Mawatari. Station 10. Large pores occur in the frontal wall and an oral pore? is borne on an extension of the peristome. Figure 2h. *Rhynchozoon* sp. A. Station 20. Many small avicularia occur around the margin. Insert shows aperture of juvenile zoecium.

(Station 31, seven miles upriver from Willapa Bay proper). Two types of invertebrate communities are distinguishable, apparently related in part to differences in salinity.



At brackish water stations (2, 31, 32, 35) tires are covered with extensive colonies of a few species of membraniporids including *Membranipora serrilamella* Osburn. No other ectoprocts occur and the only other invertebrates are *Balanus* sp., *Mytilus edulis* Linnaeus (often in large ropy masses) and some unidentified amphipods. A number of studies including those by Osburn (1944: 4) and Powell and Crowell (1967: 344) have noted the dominance of a select group of membraniporid and electrinid species in low salinity areas.

At the other "dock" stations, where salinities are higher, greater numbers of ectoproct species occur. *Bugula pacifica* Robertson and *Schizoporella unicornis* (Johnston) are found most frequently, usually attached to or encrusting *Balanus crenatus* Bruguière, *Mytilus edulis* and an unidentified branching yellow-tan sponge. The associated non-ectoproct invertebrate fauna varies and includes polychaetes (*Nereis* spp. and *Eudistyla* sp.), cnidarians (*Tealia* spp. and *Metridium* sp.), nemerteans, tunicates, echinoderms (notably *Eupentacta quinquesimata* (Selenka) and *Strongylocentrotus drobachiensis* (Müller)). The fauna is particularly rich at Stations 18, 23 and 24 in Puget Sound.

Species List

Membraniporidae: *Membranipora membranacea*; *M. villosa*; *M. serrilamella*.
 Electrinidae: **Electra crustulenta* var. *arctica*.
 Hincksinidae: *Hincksina pallida*.
 Alderinidae: ***Callopora lineata*; *Tegella aquilirostris*.
 Microporidae: *Micropora coriacea*.
 Scrupocellariidae: *Tricellaria occidentalis*; *T. ternata*; *T. erecta*.
 Bicularidae: *Bugula pacifica*; *B. pugeti*; *Caulibugula ciliata*; *Dendrobeatia curvirostrata*; *D. lichenoides*; **D. longispinosa*.
 Cribrilinidae: ***Cribrilina corbicula*.
 Hippothoidae: *Hippothoa hyalina*; *H. divaricata*.
 Schizoporellidae: *Schizoporella unicornis*; *S. linearis* var. *inarmata*; *Hippodiplosia insculpta*.
 Microporellidae: *Microporella ciliata*; *M. umbonata*; *M. vibraculifera*; *M. californica*; **Microporella* sp. A; *Fenestulina malusii* var. *umbonata*.
 Eurystomellidae: *Eurystomella bilabiata*.
 Smittinidae: *Porella columbiana*; **Smittidea prolifica*; *Parasmittina trispinosa*; *P. collifera*; *Mucronella? ventricosa*; **M. perforata*.
 Reteporidae: *Rhynchozoon tumulosum*; **Rhynchozoon* sp. A.
 Cheiloporinidae: *Cheilopora praelonga*; **Cryptosula pallasiana*.

Systematics

No synonymies are given; the reader is referred to Osburn (1950, 1952). Species are listed according to the sequence used by Osburn (1950, 1952).

ORDER CHEILOSTOMATA BUSK 1852

Suborder Anasca Levensen 1909

Membraniporidae Busk 1854

Membranipora membranacea Hincks 1880. Substrate: alga, *Egregia menziesii* (Turner). Station: 22.

Membranipora villosa Hincks 1880. Substrate: eelgrass, *Zostera* sp. Station: 3.

Membranipora serrilamella Osburn 1950. Figure 2a. Substrate: old tires. Station: 2, 18, 35. Remarks: This species resembles Osburn's (1950: 22) description in large part. The distal spines are usually dark brown. The zoecial outline within a single colony varies greatly from rectangular to oval. This species is extremely abundant in low salinity habitats.

Electrinidae d'Orbigny 1851

Electra crustulenta var. *arctica* Borg 1931. Substrate: old tires. Station: 30.

Remarks: Single median proximal spine present in most material. Previous records in Washington uncertain.

*Species not recorded previously from Washington State.

**Species recorded previously from British Columbia, Canada, but not from Washington State.

Hincksinidae Canu and Bassler 1927

Hincksina pallida (Hincks) 1884. Substrate: wood piling. Station: 20.

Remarks: Much of the material lacks the long spines reported by Osburn (1950: 45).

Alderinidae Canu and Bassler 1927

Callopora lineata (Linnaeus) 1758. Substrate: wood piling. Station: 20.

Tegella aquilirostris (O'Donoghue and O'Donoghue) 1923. Fig. 2b. Substrate: old tires, rock, wood piling. Station: 15, 18, 20, 25.

Remarks: Fresh material is bright yellow-orange around colony margin. Osburn (1950: 84) suggested that *T. aquilirostris* may "vary into *T. robertsonae*" although the lack of hollow tubular spines and prominent ovicell would distinguish the former. In our material, characteristics of both species commonly occur within the same colony; in particular, the erect hollow spines of *T. robertsonae* occur along with the slightly curved or sinuate transverse ridge of the ovicell as illustrated by O'Donoghue and O'Donoghue (1926: Plate III) for *T. aquilirostris*. The two species are here considered synonymous.

Microporidae Hincks 1880

Micropora coriacea (Esper) 1791. Substrate: small rocks. Station: 16.

Remarks: The most abundant cheilostome at this station.

Scrupocellaridae Levinsen 1909

Tricellaria occidentalis (Trask) 1857. Substrate: algae, including *Prionitis lyalli* Harvey. Station: 5, 12, 14, 26, 27.

Remarks: Internodal length varies from three zooecia per internode in small colonies and inner areas of large colonies to five or seven zooecia per internode in the outer areas of large colonies. The zooecia in these longer internodes may or may not bear ovicells.

Tricellaria ternata (Solander) 1786. Substrate: algae, including holdfasts of *Cryptopleura ruprechtiana* (Agardh) and ectoproct *Dendrobeania curvirostrata* (Robertson). Station: 7, 14, 26.

Remarks: No ovicells seen on any material. Usually three zooecia per internode but occasionally five.

Tricellaria erecta (Robertson) 1900. Substrate: glass sponge (unidentified). Station: 17.

Remarks: No ovicells seen. Five, seven, or nine zooecia per internode.

Bicellaridae Levinsen 1909

Bugula pacifica Robertson 1905. Substrate: old tires, plastic tarpaulin, rocks. Station: 6, 10, 15, 18, 19, 23, 24, 25, 29, 30, 33.

Remarks: Abundant at all stations.

Bugula pugeti Robertson 1905. Substrate: rock. Station: 26.

Remarks: Degenerate ovicells described by Robertson (1905: 271) not seen.

Caulibugula ciliata (Robertson) 1905. Substrate: wood piling. Station: 20.

Remarks: No ovicells seen. Sessile avicularia illustrated by Osburn (1950: 247) not seen.

Dendrobeania curvirostrata (Robertson) 1905. Substrate: rock. Station: 7, 16.

Dendrobeania lichenoides (Robertson) 1900. Substrate: rock. Station: 10, 12, 14, 19, 21, 26.

Remarks: Usually very abundant on protected surfaces of large rocks and boulders in the mid-intertidal region.

Dendrobeania longispinosa (Robertson) 1905. Substrate: rock. Station: 15.

Remarks: This species has only been recorded from Southern California (Robertson, 1905: 277; Osburn, 1950: 168). O'Donoghue and O'Donoghue (1923: 23) recorded, but did not figure, a long-spined variety of *Flustra* (= *Dendrobeania* in part) *lichenoides* from British Columbia, Canada, but Osburn (1950) apparently did not consider the two synonymous. In our material each zooecium bears a pair of long flaring distal spines and four to six pairs of stout lateral spines arching over the opesia; this fits Osburn's (1950: 168) description of *D. longispinosa*.

Cribrilinidae Hincks 1880

Cribrilina corbicula (O'Donoghue and O'Donoghue) 1923. Substrate: alga, *Laminaria* sp. Station: 18.

Suborder Ascophora Levinsen 1909

Hippochoidae Levinsen 1909

Hippochoa hyalina (Linnaeus) 1758. Substrate: rock, algae, old tires, hydroid stems. Station: 4, 12, 13, 14, 20, 21, 24, 25, 26, 27, 29, 30.

Hippochoa divaricata Lamouroux 1821. Substrate: small rocks. Station: 16.

Remarks: Proximal portion of zooecium more tubular for this species than illustrated by Osburn (1952: 529) but not to the extent shown by Osburn for *H. flagellum* Manzoni (Osburn, 1952: 529).

Schizoporellidae Jullien 1903 (in part)

Schizoporella unicornis (Johnston) 1847. Figures 2c, 2d. Substrate: old tires, barnacle

- Balanus crenatus* Bruguère, *Mytilus edulis* Linnaeus, the Japanese oyster *Crassostrea gigas* (Thunberg), other shells, rocks and an alga, *Codium fragile* (Suringar). Station: 1, 9, 10, 11, 12, 18, 19, 23, 24, 28, 29, 30, 33, 34.
Remarks: Fresh material is bright orange-red with dark orange-red to red embryos. A fertile zoecium often bears more than one ovicell (Powell, Sayce and Tufts, 1970).
- Schizoporella linearis* var. *inarmata* (Hincks) 1884. Substrate: small rocks. Station: 16.
- Hippodiplosia insculpta* (Hincks) 1882. Substrate: algae, including *Calliarthron* sp. and *Callophyllis* sp. and other ectoprocts. Station: 12, 14, 21, 26, 27.
Remarks: Cranberry-pink embryos seen at station 12.
- Microporellidae Hincks 1880**
- Microporella ciliata* (Pallas) 1766. Substrate: algae, including *Prionitis lyalli*. Station: 12, 14, 27.
Remarks: Fresh material from Station 12 is salmon-rose pink.
- Microporella umbonata* (Hincks) 1884. Substrate: rock. Station: 12.
Remarks: No ovicells seen.
- Microporella vibraculifera* (Hincks) 1884. Substrate: rock, shell of *Pecten* sp. Station: 13, 16.
- Microporella californica* (Busk) 1856. Substrate: shells. Station: 14.
Remarks: No ovicells seen.
- Microporella* sp. A. Figure 2e. Substrate: algae, including *Calliarthron* sp. Station: 26, 27.
Remarks: Both O'Donoghue and O'Donoghue (1923: 31; 1926: 64) and Osburn (1952: 375) noted the great variation within this genus and the difficulty of determining separate and distinct species. With paired avicularia having long setose mandibles and heavily ridged ovicell and umbo, our material does not greatly resemble Osburn's (1952: 377) descriptions of *Microporella ciliata sensu stricto*. Marcus' figure (1939: Pl. 10, fig. 17) of *M. ciliata* from "the Vancouver region" is like our material.
- Fenestulina malusii* var. *umbonata* O'Donoghue and O'Donoghue 1926. Substrate: small rocks. Station: 16.
- Eurystomellidae Levinsen 1909**
- Eurystomella bilabiata* (Hincks) 1884. Substrate: rock. Station: 26.
Remarks: Fresh material is deep raspberry-rose. Species very common at -2 ft. and lower.
- Smittinidae Levinsen 1909**
- Porella columbiana* O'Donoghue and O'Donoghue 1923. Substrate: shells, wood piling. Station: 14, 20
- Smittoidea prolifica* Osburn 1952. Figure 2f. Substrate: old tires, shells of *Crassostrea gigas*. Station: 33, 34.
Remarks: Fresh material is pale pink-orange. The presence of a rounded median oral avicularium and great number of ovicellate zoecia suggest *Smittoidea prolifica* (Osburn, 1952: 408) rather than *S. reticulata* (MacGillivray). On the West Coast the species was recorded previously only in southern California.
- Parasmittina trispinosa* (Johnston) 1838. Substrate: small rocks, shell of *Pecten* sp., wood piling. Station: 13, 16, 20.
- Parasmittina collifera* (Robertson) 1908. Substrate: rock. Station: 14, 27.
- Mucronella ventricosa* (Hassall) 1842. Substrate: small rocks. Station: 16.
- Mucronella? perforata* Okada and Mawatari 1937. Figure 2g. Substrate: alga, *Codium fragile*. Station: 10.
Remarks: Fresh material is white with pale pink embryos. The species was described from Japan by Okada and Mawatari (1937: 442) but the shape of the aperture, perforate frontal wall and median oral pore? suggest that this species should not be assigned to *Mucronella*.
- Reteporidae Smitt 1867**
- Rhynchozoon tumulosum* (Hincks) 1882. Substrate: shells, wood piling. Station: 13, 20.
Remarks: Fresh material is pink with darker pink embryos.
- Rhynchozoon* sp. A. Figure 2h. Substrate: small rocks, shells, wood piling. Station: 14, 16, 20.
Remarks: Fresh material is pale pink-orange with bright orange-pink to pink embryos. All the material included in this species lacks a single frontal avicularium, but each zoecium bears from two to nine small triangular avicularia around the margin. The small frontal avicularia and oral spines resemble the description of *R. grandiscella* (Canu and Bassler) in Osburn (1952: 459) but the ovicell and oral avicularium are unlike those described for that species.
- Cheiloporinidae Bassler 1936**
- Cheilopora praelonga* (Hincks) 1883. Substrate: eelgrass, *Zostera* sp., wood piling, old tires. Station: 3, 20, 25.
- Cryptosula pallasiana* (Moll) 1803. Substrate: old tires. Station: 18, 25, 29.
Remarks: Fresh material is pale pink.

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