

## Additional Notes on the Food of Some California Nudibranchs with a Summary of Known Food Habits of California Species

BY

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A FEW PUBLICATIONS have dealt extensively with nudibranch food habits (*e. g.*, MILLER, 1961, 1962; SWENNEN, 1961; THOMPSON, 1964), but these have treated few of the species which occur in California. This paper attempts to summarize what has previously been reported concerning food habits of species that occur in California (see Table 1) and presents additional data for some species.

The new data on food items of nudibranchs were obtained in the field while collecting nudibranchs for taxonomic and ecological studies and are not, therefore, the results of a deliberate extensive food habit study. However, we believe they should still prove useful in further investigations of nudibranch food habits. We report herein not only actual observations of ingestion of prey, but also situations in which the evidence suggests strongly that the nudibranch species has consumed a given prey species.

### ADDITIONAL FOOD NOTES

On 19 December 1976 at Pescadero Point, San Mateo County, California, a single specimen of *Antiopella barbarensis* was found on a colony of the bryozoan *Bugula californica* Robertson, 1905. The nudibranch was maintained for 9 days in a culture dish with the bryozoan. During this period, the nudibranch increased from the original 3 mm in total length to 12 mm. The animal was observed to eat the lophophores of the bryozoan.

Over a period of 3 years, several specimens of *Laila cockerelli* were found on the encrusting bryozoan *Hincksina velata* (Hincks, 1881). When found on the bryozoan, the zooecia immediately beneath the anterior end of the nudibranch were empty, while the remainder of the colony was still intact, suggesting this species consumes the bryozoan.

In the central California area, we have observed *Tritonia festiva* to be most common where the alcyonarian *Clavularia*

*sp.* is also most common. Since tritoniids are known to feed on alcyonarians (WICKSTEN & DEMARTINI, 1973; GOMEZ, 1973; THOMPSON, 1971), specimens of *T. festiva* and *Clavularia* *sp.* were placed together in a culture dish of sea water. Of the 4 specimens of *T. festiva* that were offered *Clavularia* *sp.*, 3 were each seen to eat one or more polyps. We have not observed them eating any other organism.

On 2 November 1975 at Carmel Point, Monterey County, California, 2 specimens of *Ancula pacifica* were found, together with their nidosomes on the entoproct *Barentsia ramosa* (Robertson, 1900). Subsequent observation in the laboratory indicated they would eat the calyx of the entoproct.

On 27 January 1976, 2 specimens of *Aldisa sanguinea* were found on the sponge *Hymendesmia brepha* (deLaubenfels, 1930). Immediately beneath the mouth of both specimens was a depression which had been rasped into the sponge.

A single specimen of *Anisodoris nobilis* was found on the sponge *Lissodendoryx firma* (Lambe, 1895) with a depression immediately beneath the mouth of the nudibranch. *Anisodoris nobilis* has also been reported to feed on numerous other species of sponges (see Table 1).

Over a span of 3 years, numerous specimens of *Cadlina modesta* have been found on the sponge *Aplysilla glacialis* (Dybowski, 1880), often accompanied by their nidosomes. Most specimens have been found with a depression rasped into the sponge immediately beneath them, and 2 specimens were seen eating the sponge. Two specimens of *C. flavomaculata* were also found on *A. glacialis* with depressions rasped into the sponge beneath them.

A single specimen of *Discodoris heathi* was found on the sponge *Adocia gellindra* (deLaubenfels, 1932) (as *Reniera* *sp.* a in SMITH & CARLTON, 1975). There was a large depression rasped into the sponge beneath the nudibranch.

On 26 October 1975 at Morro Bay, San Luis Obispo County, California, 3 specimens of *Hallaxa chani* were

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Table 1

Summary of nudibranch-food associations for species occurring in California.  
(P) indicates personal observation by the authors.

Nudibranch Species	Food Item
<b>DORIDACEA</b>	
Anadoridacea	
<b>SUCTORIA</b>	
<b>CORAMBIDAE</b>	
<i>Corambe pacifica</i>	<i>Membranipora villosa</i> <sup>(52, 53)</sup> on <i>Membranipora serrilamella</i> <sup>(58)</sup>
<i>Doridella steinbergae</i>	<i>Membranipora</i> sp. <sup>(56)</sup> <i>Membranipora serrilamella</i> <sup>(50)</sup> <i>Membranipora membranacea</i> <sup>(52)</sup> <i>Membranipora</i> spp. <sup>(59)</sup>
<b>OKENIDAE</b>	
Anculinae	
<i>Ancula pacifica</i>	<i>Barentsia ramosa</i> <sup>(P)</sup>
Hopkinsiinae	
<i>Hopkinsia rosacea</i>	<i>Eurystomella bilabiata</i> <sup>(57, P)</sup>
<b>ONCHIDORIDIDAE</b>	
<i>Acanthodoris brunnea</i>	bryozoans <sup>(75)</sup>
<i>Acanthodoris nanaimoensis</i>	compound ascidians <sup>(P)</sup>
<i>Acanthodoris pilosa</i>	<i>Flustrellidra hispida</i> <sup>(46, 63)</sup> <i>Alcyonidium hirsutum</i> , <i>Callopora dumerili</i> <sup>(40)</sup> <i>Alcyonidium gelatinosum</i> <sup>(61, 40)</sup> <i>Alcyonidium polyoum</i> <sup>(40, 63)</sup> <i>Cryptosula pallasiana</i> <sup>(11)</sup> on <i>Alcyonidium gelatinosum</i> <sup>(61, 63)</sup> on <i>Alcyonidium polyoum</i> <sup>(40, 61)</sup>
<i>Onchidoris bilamellata</i>	<i>Balanus balanoides</i> <sup>(2, 40, 48, 61)</sup> <i>Balanus crenatus</i> <sup>(2, 61)</sup> <i>Balanus porcatus</i> <sup>(40)</sup> <i>Elminius modestus</i> <sup>(61)</sup> barnacles <sup>(11, P)</sup>
<i>Onchidoris muricata</i>	<i>Alcyonidium polyoum</i> <sup>(61)</sup> <i>Celleporella hyalina</i> , <i>Cryptosula pallasiana</i> , <i>Electra pilosa</i> , <i>Escharella immersa</i> , <i>Microporella ciliata</i> , <i>Porella concinna</i> , <i>Schizomavella linearis</i> , <i>Schizoporella unicornis</i> , <i>Smittina reticulata</i> , <i>Umbonula littoralis</i> <sup>(40)</sup> <i>Membranipora membranacea</i> <sup>(5, 40, 62, 63)</sup> on <i>Reginella mucronata</i> <sup>(P)</sup>
<b>NONSUCTORIA</b>	
<b>TRIOPHIDAE</b>	
Triophinae	
<i>Triopha carpenteri</i>	<i>Caulibugula ciliata</i> , <i>Membranipora membranacea</i> , <i>Cauloramphus spiniferum</i> , <i>Scrupocellaria californica</i> , <i>Bugula mollis</i> , <i>Crisia occidentalis</i> , <i>Tricellaria</i> sp. <sup>(45)</sup> ectoprocts <sup>(53)</sup>

Table 1 (continued)

Nudibranch Species	Food Item
<i>Triopha maculata</i>	<i>Scrupocellaria californica</i> , <i>Dendrobeanina laxa</i> , <i>Caulibugula ciliata</i> , <i>Bugula mollis</i> , <i>Tricellaria</i> sp., <i>Crisia occidentalis</i> , <i>Filicrisia fran-</i> <i>ciscana</i> <sup>(45)</sup>
<b>POLYGERIDAE</b>	
<i>Laila cockerelli</i>	<i>Hincksina velata</i> <sup>(P)</sup>
<i>Polycera atra</i>	<i>Bugula</i> <sup>(52)</sup> <i>Membranipora membranacea</i> <sup>(74)</sup> <i>Membranipora</i> , <i>Lophogorgia chilensis</i> <sup>(31)</sup> on <i>Bugula pacifica</i> <sup>(P)</sup>
<i>Polycera hedgpethi</i>	on <i>Bugula pacifica</i> <sup>(P)</sup>
<i>Polycera zosteræ</i>	<i>Membranipora</i> sp., <sup>(54)</sup> on <i>Bowerbankia gracilis</i> var. <i>aggregata</i> <sup>(80)</sup>
<b>Eudoridacea</b>	
<b>CADLINIDAE</b>	
Cadlininae	
<i>Cadlina flavomaculata</i>	<i>Aplysilla glacialis</i> <sup>(P)</sup>
<i>Cadlina luteomarginata</i>	<i>Halichondria panicea</i> , <i>Myxilla incrustans</i> , <i>Higginsia</i> sp. <sup>(7)</sup>
<i>Cadlina modesta</i>	<i>Aplysilla glacialis</i> <sup>(P)</sup>
<b>CHROMODORIDIDAE</b>	
<i>Chromodoris mcfarlandi</i>	on <i>Gellius</i> sp., on <i>Haliclona</i> sp. <sup>(7)</sup>
<i>Chromodoris porterae</i>	on <i>Dysidea ambliæ</i> <sup>(P)</sup>
<i>Hypselodoris californiensis</i>	<i>Stelletta estrella</i> , <i>Haliclona</i> sp. <sup>(37)</sup> on <i>Dysidea ambliæ</i> <sup>(P)</sup>
<b>ACTINOCYCLIDAE</b>	
<i>Hallaxa chani</i>	<i>Didemnum carnulentum</i> <sup>(P)</sup>
<b>ALDISIDAE</b>	
<i>Aldisa sanguinea</i>	on <i>Ophlitaspongia pennata</i> <sup>(18)</sup> <i>Hymendesmia brepha</i> <sup>(P)</sup>
<b>ROSTANGIDAE</b>	
<i>Rostanga pulchra</i>	<i>Esperiopsis originalis</i> <sup>(13)</sup> <i>Plocamia lithophoenix</i> , <i>P. karykina</i> , <i>Acarnus erithacus</i> <sup>(56, 71)</sup> <i>Ophlitaspongia pennata</i> <sup>(13, 56, 71)</sup> on <i>Isociona lithophoenix</i> , on <i>Esperiopsis originalis</i> <sup>(7)</sup>
<b>ARCHIDORIDIDAE</b>	
<i>Archidoris montereyensis</i>	<i>Halichondria panicea</i> <sup>(7, 18, P)</sup>
<i>Archidoris odhneri</i>	<i>Halichondria panicea</i> <sup>(7, 54)</sup> <i>Myxilla incrustans</i> , <i>Mycalæ adhaerens</i> <sup>(7)</sup> <i>Stylissa stipitata</i> , <i>Tedania</i> sp., <i>Craniella</i> sp., <i>Syringella amphispicula</i> <sup>(54)</sup>
<b>DISCODORIDIDAE</b>	
<i>Discodoris heathi</i>	on <i>Halichondria panicea</i> , on <i>Myxilla incrustans</i> <sup>(7)</sup> <i>Adocia gellindra</i> <sup>(P)</sup>
<i>Anisodoris nobilis</i>	<i>Myxilla agennes</i> , <i>Paresperella psila</i> , <i>Zygherpe hyaloderma</i> , <i>Mycalæ</i> <i>macginitiei</i> , <i>Prianos</i> sp. <sup>(37)</sup> <i>Mycalæ adhaerens</i> , <i>Haliclona permollis</i> , <i>Halichondria panicea</i> <sup>(7)</sup> <i>Lissodendoryx firma</i> <sup>(P)</sup>

Table 1 (continued)

Nudibranch Species	Food Item
<i>Diaulula sandiegensis</i>	on <i>Halichondria panicea</i> , on <i>Myxilla incrustans</i> , <i>Petrosia dura</i> <sup>(7)</sup> <i>Halichondria bowerbanki</i> <sup>(P)</sup> <i>Haliclona permollis</i> <sup>(7, 17)</sup> <i>Haliclona sp.</i> <sup>(19)</sup>
Porodoridaeae	
DENDRODORIDIDAE	
<i>Doriopsilla albopunctata</i>	<i>Cliona celata</i> , <i>Ficulina suberea</i> , <i>Acarnus erithacus</i> , <i>Suberites sp.</i> <sup>(87)</sup>
DENDRONOTACEA	
TRITONIDAE	
<i>Tritonia diomedea</i>	<i>Virgularia sp.</i> <sup>(64)</sup> <i>Ptilosarcus gurneyi</i> <sup>(70)</sup>
<i>Tritonia festiva</i>	<i>Clavularia sp.</i> <sup>(P)</sup> <i>Ptilosarcus gurneyi</i> <sup>(19, 70)</sup> <i>Lophogorgia chilensis</i> <sup>(19)</sup>
<i>Tochuina tetraquetra</i>	<i>Gersemia rubiformis</i> <sup>(68)</sup> <i>Ptilosarcus gurneyi</i> <sup>(64, 70)</sup>
DENDRONOTIDAE	
<i>Dendronotus albus</i>	on <i>Plumularia sp.</i> <sup>(P)</sup>
<i>Dendronotus diversicolor</i>	on <i>Abietinaria spp.</i> , on <i>Sertularella tricuspida</i> , on <i>Hydrallmania distantans</i> <sup>(51)</sup>
<i>Dendronotus frondosus</i>	<i>Tubularia indivisa</i> <sup>(40, 61)</sup> <i>Tubularia larynx</i> <sup>(9, 40)</sup> <i>Dynamena pumila</i> , <i>Hydrallmania falcata</i> <sup>(84, 60)</sup> <i>Sertularia argentea</i> <sup>(40)</sup> <i>Sertularia cupressina</i> <sup>(61)</sup> on <i>Abietinaria abietina</i> <sup>(84)</sup> on <i>Sertularia argentea</i> <sup>(14, 47)</sup> <i>Coryne sp.</i> <sup>(75)</sup> on <i>Aglaophenia</i> <sup>(75)</sup> on <i>Sertularia cupressina</i> <sup>(14)</sup> <i>Hydractinia echinata</i> <sup>(85)</sup> <i>Tubularia crocea</i> , <i>Obelia spp.</i> <sup>(11)</sup> <i>Sertularia dichotoma</i> <sup>(82)</sup> <i>Botryllus schlosseri</i> <sup>(45)</sup>
<i>Dendronotus iris</i>	<i>Pachycerianthus fimbriatus</i> <sup>(69, P)</sup>
<i>Dendronotus subramosus</i>	<i>Aglaophenia struthionides</i> <sup>(51)</sup>
TETHYIDAE	
<i>Melibe leonina</i>	Gammarids, Caprellids <sup>(25)</sup> Copepods <sup>(1, 25, 74)</sup> Amphipods <sup>(74)</sup>
DOTONIDAE	
<i>Doto amyra</i>	on <i>Obelia</i> <sup>(75)</sup>



Table 1 (continued)

Nudibranch Species	Food Item
<b>ARMINACEA</b>	
<b>EUARMINOIDEA</b>	
<b>ARMINIDAE</b>	
<i>Armina californica</i>	<i>Renilla koellikeri</i> <sup>(5, 86, 65)</sup> <i>Renilla 'amethystina'</i> <sup>(58)</sup> <i>Ptilosarcus gurneyi</i> <sup>(70, P)</sup>
<b>PACHYGNATHA</b>	
<b>DIRONIDAE</b>	
<i>Dirona albolineata</i>	<i>Margarites pupillus</i> , <i>M. helycinus</i> , <i>Lacuna carinatus</i> , ectoprocts, hydroids, small crustaceans, sponges, barnacles, tunicates <sup>(52)</sup>
<i>Dirona picta</i>	on <i>Thaumatoporella</i> sp. <sup>(P)</sup> <i>Aglaophenia</i> sp. <sup>(76)</sup> <i>Celleporella hyalina</i> <sup>(75)</sup>
<b>ZEPHYRINIDAE</b>	
<i>Antiopella barbarensis</i>	<i>Bugula californica</i> <sup>(P)</sup> <i>Corymorpha palma</i> <sup>(74)</sup>
<b>AEOLIDACEA</b>	
<b>EUEOLIDOIDEA</b>	
<b>PLEUROPROCTA</b>	
<b>CORYPHELLIDAE</b>	
<i>Coryphella trilineata</i>	on <i>Eudendrium</i> sp., on <i>Tubularia crocea</i> <sup>(P)</sup>
<b>FLABELLINIDAE</b>	
<i>Flabellinopsis iodinea</i>	<i>Eudendrium ramosum</i> <sup>(57)</sup> <i>Diplosoma pizoni</i> <sup>(74)</sup>
<b>ACLEIOPROCTA</b>	
<b>EUBRANCHIDAE</b>	
Cumanotinae	
<i>Cumanotus beaumonti</i>	<i>Tubularia crocea</i> <sup>(P)</sup>
Eubranchninae	
<i>Eubranchnus olivaceus</i>	on <i>Obelia longissima</i> <sup>(46)</sup>
<i>Eubranchnus rustyus</i>	on <i>Hydractinia</i> sp. <sup>(50)</sup> on <i>Plumularia lagenifera</i> <sup>(54)</sup> on <i>Obelia</i> <sup>(75)</sup>
<b>CUTHONIDAE</b>	
Precuthoninae	
<i>Precuthona divae</i>	on <i>Hydractinia</i> sp. <sup>(10, 30, P)</sup>
Cuthoninae	
<i>Tenellia pallida</i>	<i>Cordylophora lacustris</i> <sup>(44)</sup> <i>Gonothyraea loveni</i> <sup>(50)</sup> <i>Protohydra leuckarti</i> , <i>Psammohydra</i> sp. <sup>(55)</sup> on <i>Obelia dichotoma</i> <sup>(12)</sup> <i>Laomedea loveni</i> , <i>L. longissima</i> , <i>Cordylophora caspia</i> <sup>(61)</sup> <i>Obelia</i> , <i>Podocoryne</i> <sup>(58)</sup>
<i>Catriona alpha</i>	<i>Tubularia marina</i> , <i>T. sp.</i> , on <i>Syncoryne eximia</i> , on <i>Obelia</i> sp. <sup>(54)</sup> on <i>Tubularia crocea</i> <sup>(P)</sup>

Table 1 (continued)

Nudibranch Species	Food Item
<b>FIONIDAE</b>	
<i>Fiona pinnata</i>	<i>Porpita</i> sp. <sup>(34)</sup> <i>Lepas anatifera</i> <sup>(P)</sup> barnacles <sup>(16)</sup> <i>Lepas</i> <sup>(8, 58)</sup> <i>Lepas anserifera</i> <sup>(6)</sup> <i>Verella vellella</i> <sup>(4, 16, 34)</sup> <i>Verella spirans</i> <sup>(87)</sup> <i>Verella</i> <sup>(8, 57)</sup>
<b>CLEIOPROCTA</b>	
<b>FACELINIDAE</b>	
<i>Hermisenda crassicornis</i>	<i>Ptilosarcus gurneyi</i> <sup>(70)</sup> <i>Obelia</i> spp., cannibalistic <sup>(93)</sup>
<i>Phidiana pugnax</i>	<i>Hydractinia</i> sp. <sup>(P)</sup>
<b>AEOLIDIIDAE</b>	
<i>Aeolidia papillosa</i>	<i>Tealia crassicornis</i> <sup>(15, 39, 67)</sup> <i>Actinia</i> , "Anthea" <sup>(16)</sup> <i>Actinia equina</i> <sup>(15, 40, 61, 78)</sup> <i>Anemonia sulcata</i> <sup>(15, 40)</sup> <i>Diadumene cincta</i> <sup>(61)</sup> ' <i>Metridium marginatum</i> ' <sup>(56)</sup> <i>Metridium senile</i> <sup>(15, 61, 63, 67, 78, P)</sup> <i>Sagartia troglodytes</i> <sup>(40, 61)</sup> <i>Sagartiogeton undata</i> <sup>(61)</sup> <i>Stomphia coccinea</i> <sup>(35)</sup> <i>Tealia felina</i> <sup>(15, 40, 61, 63)</sup> <i>Tubularia indivisa</i> <sup>(40)</sup> <i>Tealiopsis stella</i> <sup>(93)</sup> <i>Metridium dianthus</i> <sup>(11)</sup> <i>Epiactis prolifera</i> , <i>Anthopleura xanthogrammica</i> , <i>Diadumene luciae</i> , <i>Tealia coriacea</i> , <i>Anthopleura artemisia</i> , <i>Corynactis californica</i> <sup>(67)</sup> <i>Actinothoe sphyrodeta</i> , <i>Anthopleura balli</i> , <i>Sagartia elegans</i> , <i>Cereus</i> <i>pedunculatus</i> , <i>Aiptasia couchi</i> , <i>Corynactis viridis</i> <sup>(15)</sup> <i>Anthopleura elegantissima</i> <sup>(15, 58, 67)</sup>
<i>Aeolidiella takanosimensis</i>	<i>Sagartia</i> <sup>(58)</sup>
<i>Cerberilla mosslandica</i>	burrowing anemone <sup>(98)</sup>
<b>SPURILLIDAE</b>	
<i>Spurilla oliviae</i>	<i>Metridium senile</i> <sup>(98, P)</sup>
<i>Spurilla chromosoma</i>	<i>Metridium senile</i> <sup>(93)</sup>

In order to conserve space the full citation of the taxa discussed and listed was excluded from the table. It is given in alphabetical order below.

#### Mollusca

*Acanthodoris nanaimoensis* O'Donoghue, 1921; *A. pilosa* (Abildgaard, 1789); *Aeolidia papillosa* (Linnaeus, 1761); *Aeolidiella*

*takanosimensis* Baba, 1930; *Aldisa sanguinea* (Cooper, 1862); *Anacula pacifica* MacFarland, 1905; *Anisodoris nobilis* (MacFarland, 1905); *Antiopella barbata* (Cooper, 1863); *Archidoris montereyensis* (Cooper, 1862); *A. odhneri* (MacFarland, 1966); *Armina californica* (Cooper, 1862)  
*Cadlina flavomaculata* MacFarland, 1905; *C. luteomarginata* MacFarland, 1966; *C. modesta* MacFarland, 1966; *Catriona alpha* (Baba

& Hamatani, 1963); *Cerberilla mosslandica* McDonald & Nybakken, 1975; *Chromodoris mcfarlandi* Cockerell, 1902; *C. porterae* Cockerell, 1902; *Corambe pacifica* MacFarland & O'Donoghue, 1929; *Coryphella trilineata* O'Donoghue, 1921; *Cumanotus beaumonti* (Eliot, 1906)  
*Dendronotus albus* MacFarland, 1966; *D. diversicolor* Robilliard, 1970; *D. frondosus* (Ascanius, 1774); *D. iris* (Cooper, 1863); *D. subramosus* MacFarland, 1966; *Diaulula sandiegensis* (Cooper, 1862); *Dirona albolineata* Cockerell & Eliot, 1905; *D. picta* Cockerell & Eliot, 1905; *Discodoris heathi* MacFarland, 1905; *Doridella steinbergae* (Lance, 1962); *Doriopsilla albopunctata* (Cooper, 1863)  
*Eubranthus olivaceus* (O'Donoghue, 1922); *E. rustyus* (Marcus 1961)  
*Fiona pinnata* (Eschscholtz, 1831); *Flabellinopsis iodinea* (Cooper, 1862)  
*Hallaxa chani* Gosliner & Williams, 1975; *Hermisenda crassicornis* (Eschscholtz, 1831); *Hopkinsia rosacea* MacFarland, 1905; *Hypselodoris californiensis* (Bergh, 1879)  
*Lacuna carinata* Gould, 1848; *Laila cockerelli* MacFarland, 1905  
*Margarites helicinus* (Phipps, 1774); *M. pupillus* (Gould, 1849); *Melibe leonina* (Gould, 1852)  
*Onchidoris bilamellata* (Linnaeus, 1767); *O. muricata* (O. F. Müller, 1776)  
*Phidiana pugnax* Lance, 1962; *Polycera atra* MacFarland, 1905;

*P. hedgpethi* Marcus, 1964; *P. zosteræ* O'Donoghue, 1924; *Precuthona divae* Marcus, 1961  
*Rostanga pulchra* MacFarland, 1905  
*Spurilla chromosoma* Cockerell & Eliot, 1905; *S. oliviae* (MacFarland, 1966)  
*Tenellia pallida* (Alder & Hancock, 1854); *Tochuina tetraquetra* (Pallas, 1788); *Triopha carpenteri* (Stearns, 1873); *Triopha maculata* MacFarland, 1905; *Tritonia diomedea* Bergh, 1894; *Tritonia festiva* (Stearns, 1873)

#### Non-Mollusca

*Adocia gelindra* (de Laubenfels, 1932); *Aphysilla glacialis* (Dybowski, 1880)  
*Barentsia ramosa* (Robertson, 1900); *Bugula californica* Robertson, 1905; *B. pacifica* Robertson, 1905  
*Didemnum carnulentum* Ritter & Forsyth, 1917  
*Eurystomella bilabiata* (Hincks, 1884)  
*Halichondria bowerbanki* (Burton, 1930); *H. paniceum* (Pallas, 1766); *Hincksina velata* (Hincks, 1881); *Hymendesmia brepha* (de Laubenfels, 1930)  
*Lepas anatifera* Linnaeus, 1758; *Lissodendoryx firma* (Lambe, 1895)  
*Metridium senile* (Linnaeus, 1767)  
*Pachycerianthus fimbriatus* (McMurrich, 1910); *Ptilosarcus gurneyi* (Gray, 1860)  
*Tubularia crocea* (Agassiz, 1862)

found on the ascidian *Didemnum carnulentum* Ritter & Forsyth, 1917. The nudibranchs had grazed large portions of the ascidian.

Several very large (over 100mm) specimens of both *Diaulula sandiegensis* and *Archidoris montereyensis*, along with their nidosomes, have been collected on a sponge (tentatively identified as *Halichondria bowerbanki* Burton, 1930) in an erosion channel in the upper third of Elkhorn Slough, Monterey County, California. As in many of the above cases, depressions had been rasped into the sponge. Further, this was the only species of sponge noted to be present in the channel and hence, possibly the only available food.

Over a period of 3 years, large numbers of *Cumanotus beaumonti*, frequently with their nidosomes, have been observed on and collected from the gymnoblastoid hydroid *Tubularia crocea* (Agassiz, 1862). We have never found *C. beaumonti* on any substrate other than *T. crocea*, and if the nudibranch is removed from the hydroid, it immediately seeks to return to the hydroid. In the laboratory, the eolids were observed to feed upon the polyps of the hydroid.

On 12 April 1977, large numbers of the eolid *Phidiana pugnax* were found in close association with the gymnoblastoid hydroid *Hydractinia* sp. at Carmel Point, Monterey County, California. Later, in laboratory aquaria, the *Hydractinia* colonies were quickly consumed by *P. pugnax*. We have never observed them consuming other hyd-

roids, though they are known to attack other nudibranchs under crowded aquarium conditions (LANCE, 1962a).

Over a period of several years, small (3 to 7mm total length) specimens of *Onchidoris muricata* have been collected, almost always on the encrusting bryozoan *Reginella mucronata* (Canu & Bassler, 1923).

## PREVIOUS FOOD RECORDS

Table 1 summarizes our search of the literature relevant to the recorded food habits of California nudibranchs. Included are the new data reported in this paper as well as additional personal observations of nudibranchs on possible food species which they were not actually seen to ingest (indicated by <sup>P</sup>). Where more than a single food item is listed, the order of listing does not imply preference (which is often unknown) of the nudibranch. We include the table as a guide to those who may find it useful in doing additional ecological or experimental studies of California nudibranchs.

## DISCUSSION

The summary table includes certain nudibranch species from California that are also found in other geographical



areas (e.g., *Aeolidia papillosa*, *Acanthodoris pilosa*, *Onchidoris muricata*, *Dendronotus frondosus*, and others). Hence, the food items reported here may not necessarily be present in California. Widely distributed nudibranch species may well have additional food items or different preferences in different geographical locations. Certainly for *A. papillosa*, the studies of WATERS (1973) suggest that the major prey preferences differ between those occurring in Atlantic waters and those occurring in Pacific waters. Such differing prey preferences have not, to our knowledge, been investigated for other nudibranchs with wide geographical ranges. The whole field of prey preference studies for most California nudibranchs remains relatively little explored, and we hope this review may stimulate additional work.

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